TECHNOLOGY DEPARTMENT

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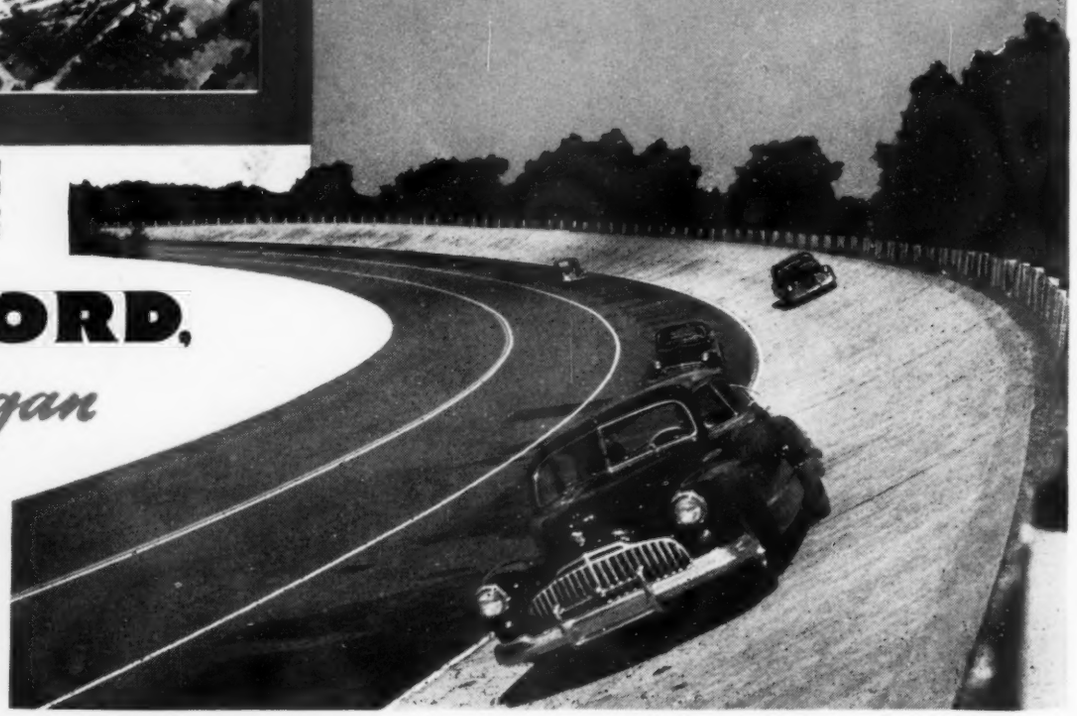
TELEPHONE ENGINEER and MANAGEMENT

SEPTEMBER, 1948

Reproduction of General Motors Proving Ground exhibited in Chicago Museum of Science and Industry.

NO CROWDS CHEER the drivers or the autos that speed around the General Motors Proving Ground in Milford, Michigan. Yet here in an unceasing drama of discovery, new cars are driven day and night over its carefully engineered obstacle courses in a constant search for greater endurance, safety, economy and comfort. Covering 1268 acres, the unique General Motors testing ground at Milford is the "world's largest and most complete outdoor automotive research laboratory."



MILFORD, *Michigan*

)DAY, thanks to constant testing under the controlled conditions of special "proving grounds," positive safety can be built into cars before they go on the market. Faulty mechanisms can be corrected and new needs brought to light before production. Persistent, specialized study has paved the way for progress in the automotive industry.

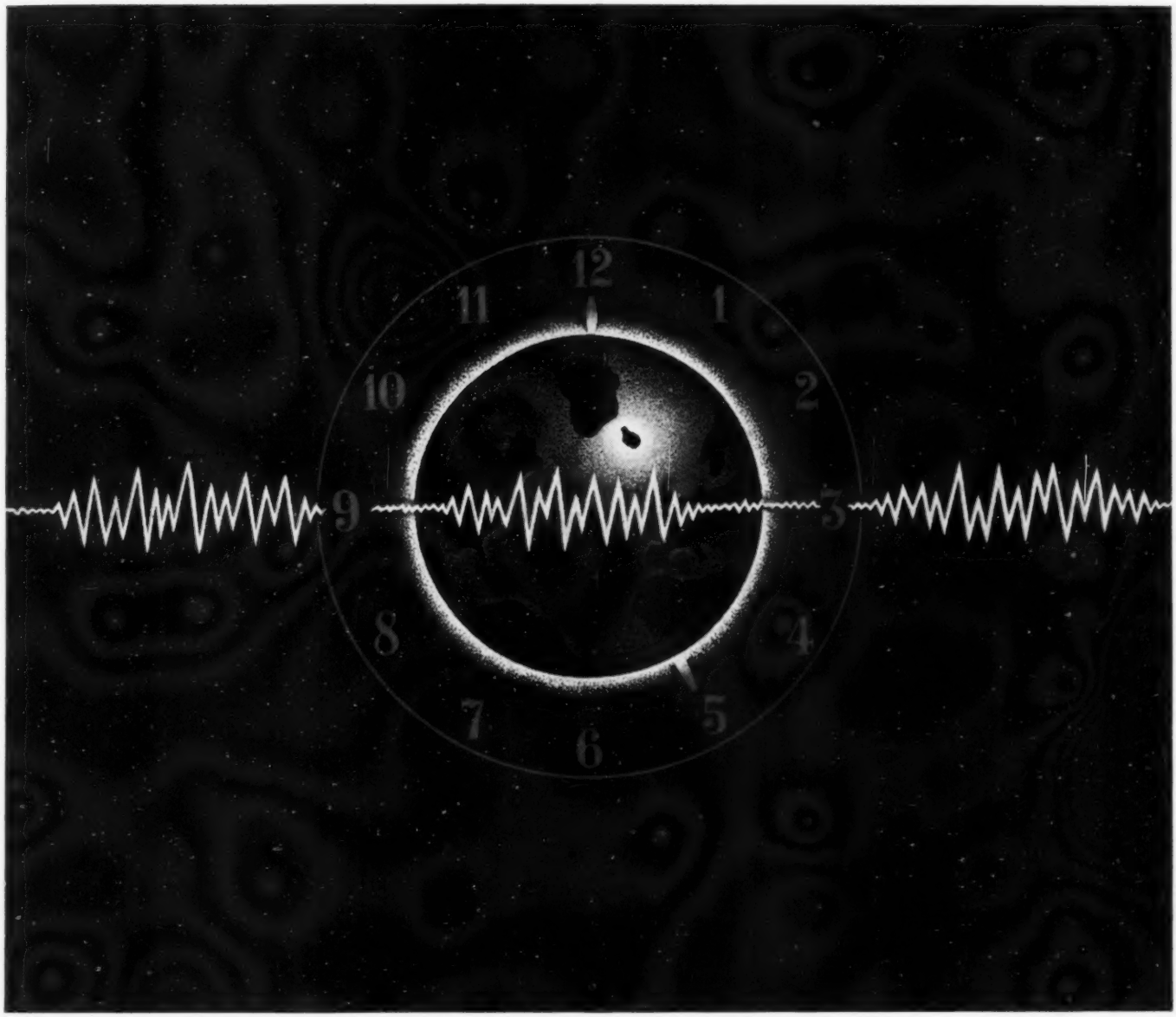
Persistent, specialized study has also paved the way for progress in the publishing of attractive, accurate and revenue producing telephone directories.

Years of experience have been the proving grounds for the policies and procedures of the General Telephone Directory Company. We now publish directories for progressive companies in more than 1000 towns and cities all over the country, including the Michigan Associated Telephone Company in Milford, Michigan.

We invite you to profit by our experience. In response to your inquiry we will be pleased to submit a complete Directory Service Plan to fit the directory needs of your company.

GENERAL TELEPHONE DIRECTORY COMPANY

Eastern Office: 185 North Wabash Avenue
Chicago 1, Illinois • Telephone State 5478
Western Office: Press-Telegram Building
Long Beach 12, California • Telephone 6-7221



19 YEARS AGO THIS MONTH

The telephone industry drove another "golden spike"

Though for some time, trans-Atlantic telephone service had been available during certain hours, it was not until September 10, 1929 that it was placed on a 24-hour basis.

This event had considerably more significance than its announcement implied. It was the telephone industry's "golden spike" that joined the United States with all the nations of western Europe. Thus was established round-the-clock service between subscribers in this country and 85% of the telephones in use throughout the world. The telephone *Spirit of Service* was on the wing . . . maintaining its tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. For more than half a century, Exide Batteries have been proving themselves worthy of that trust.

Exide®
BATTERIES

1888 . . . Dependable Batteries for 60 Years . . . 1948

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

IT SEEMS TO US...

GLEN VOYLES of National Telephone Supply Co., Cleveland, is the champion commuter of anyone we know. His office is in Cleveland and home is in Terre Haute, Ind. When Daylight time goes out for the winter Glen will breathe easier as his time schedules are quite unwieldy and results in his arriving home by air from Cleveland before he leaves.—If you can figure it out.

• • •

After hearing ALBERT W. KIMBER speak at the USITA Executives Conference in Chicago last April we decided that our readers should hear more from him. At long last we are presenting in this issue the first of a series of articles on financial subjects that are most important to telephone company management. These copyrighted articles will appear exclusively in the TELEPHONE ENGINEER publications. We urge you to read each of his papers as they appear.

• • •

The various Committees active in preparation of the 51st annual convention of the U. S. Independent Telephone Association are now reporting that everything will be in readiness for opening day October 11 at Chicago. The Banquet Committee is lining up the best show ever presented at this function. Hotel reservations indicate a heavy attendance for the 3-day meeting.

• • •

Selection of a full time secretary for the Michigan Independent Telephone Association has not been made at press time for this issue. The annual meeting of that association is slated for September 23 and 24 and it is possible that a selection will be made at that. Officers of the Michigan association are particularly anxious to have an active secretary to aid and serve the smaller telephone companies in their area and we hope their plan will be in operation soon.

• • •

Our deepest sympathy goes to H. W. HUBENTHAL, secretary of the Oklahoma Telephone Association, whose wife recently died. We knew and admired the Hubenthal team for many years.

The National Telephone Magazine

TELEPHONE ENGINEER and MANAGEMENT

SEPTEMBER, 1948 **VOL. 52, NUMBER 9**

Editor, RAY W. SMITH • *Advertising Director*, ROY F. SMITH
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COVER: Michigan Bell students learn some phases of plant engineering at Detroit plant training school. The school does not strive to turn out finished and completed "products" but it does give a man enough at first to become familiar with the job he is to do. Further training on the job then continues under the guidance of the employee's supervisor.—(Courtesy of Michigan Bell.)

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ACORN INSULATED WIRE

- Drop Wire
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- Bridle Wire

in ACORN'S "tough as nails" NEOPRENE jacket . . .

- Inside Wire
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with Enduring ACORNITE

32 years of specialization in the manufacture of communication wires has built an enviable performance record for ACORN Drop Wire.

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427 W. Randolph St., Chicago

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4815 Superior Ave., Cleveland

No. 5

Highlights in Wire Communication

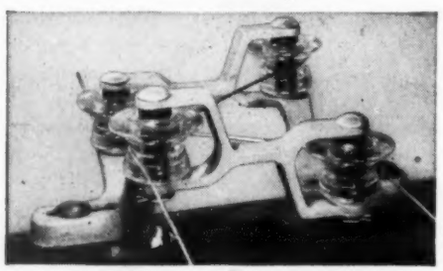
"BY DIRECTION OF THE PRESIDENT OPERATIONS AGAINST THE ENEMY ARE SUSPENDED"

SO STARTED the message that stopped a war.

These heartening words flashed by telegraph on August 13, 1898, from General Sheridan to Major General Brooks, ended hostilities and brought peace to Spain and America. A highlight in wire communication!

Today a vast telephone and telegraph system serves the people of this nation. Contributing to its efficiency, Hemingray Insulators help carry the wires across the country. Experience and research make Hemingray Insulators the finest obtainable today.

Write for complete historical outline of insulator development.



Rogers Case pole-arm carrier-circuit transposition made with long-life Hemingray No. 1088 insulators.

HEMINGRAY INSULATORS

American Structural Products Company

MUNCIE, INDIANA

Subsidiary of **Owens-Illinois Glass Company**

TELEPHONE COURTESY:—"We note that Minnesota Telephone Company is appealing to subscribers in the Falls area to co-operate in its program of rehabilitation and expansion. Specifically, telephone users are asked to limit their social calls to five minutes during the 30 days that will be required to install additional switch board equipment.

"The request is entirely reasonable. . . . Personally, we can't see why the telephone company should be apologetic about asking people to limit social calls to five minutes. We can think of no social message so involved or so important as to need more than five minutes in the telling. Some of the trifling chit-chat that will be eliminated by this voluntary restriction is probably better left unsaid, anyway.

"It's probable that the line monopolists will be able to go at it to their heart's content after all the new cable and exchange equipment is installed. Until that happy day, the social callers will confer a favor on humanity by leaving the lines fairly clear for business and emergency purposes."—**International Falls (Minn.) Journal.**

• • •

A WORD OF CAUTION:—"Among the companies whose applications for increased rates have been approved are some that will require additional capital. Some will secure finances through their local banks; some will no doubt, offer additional stock; others will negotiate long term loans. No matter what method is followed in securing additional finances, we call attention to the following: In many of these companies the central office equipment has reached its capacity; in some instances magneto service should be replaced with common battery service—in others, undoubtedly, dial service will be considered. Then again, in many instances cable capacity has been reached. In some cases complete rehabilitation of the distributing system of the outside plant is necessary and adviseable to meet public demands for extension and modernization. No matter which of these problems confronts your company, do not proceed without giving careful consideration to a well engineered plan which takes cognizance of what plant and equipment requirements will be in the next ten years at least. Remember, it is much easier to erase the lines on a sketch or blue print than it is to change the location of a pole line, or conduit, after the work is done. That was expensive before the days of high prices, manpower shortages and material scarcities."—**Minnesota Telephone Association Bulletin.**

• • •

SUPPORT COMMUNITY WELFARE:—"It is not enough to be a representative part of a community in exterior only, we should stand shoulder to shoulder with other business men and give our moral support and our share of time and money in furthering the welfare of our community. Yet, too often it is found when drives are made to advance civic or public welfare, solicitors leave the telephone office with empty hands.

"Some representatives of this great industry of ours—the telephone industry—while physically a part of the community, apparently have no time to give to public welfare, their budget does not provide for a contribution toward civic improvement.

"We are glad to say we find many telephone companies who are part and parcel of every enterprise which makes for the betterment of the community in which they operate. Their employees usually are active members of civic and commercial clubs and lend themselves to public service. Their time and ability are at the service of every worthy undertaking and the companies give financial support to every worthy cause. The result is community good will."—**Nebraska Telephone Association Bulletin.**

STRENGTH

IS ITS MIDDLE NAME

—and COPPER makes it PERMANENT

It's the copper-protected alloy steel core that gives Copperweld Line Wire its permanent strength—a strength 2 to 3 times greater than hard-drawn copper wire. And the thick copper covering inseparably molten-welded to the steel assures permanent protection against rust.

Having the best electrical conductance of any high-strength conductor, Copperweld Line Wire provides excellent voice transmission and is ideal for high frequency circuits. It is light in weight, pliable, easy to string . . . and is especially suited for long span construction.

For safety, reliability and economy in all types of service, you'll find it pays to standardize on Copperweld—the wire that combines the strength of steel with the conductance and permanence of copper.

COPPERWELD STEEL COMPANY
GLASSPORT, PA.
Sales Offices in Principal Cities

GRIP-FLEX 3B
The Ideal Insulator Tie for use with Copperweld Line Wire

Copperweld TRADE MARK NON-RUSTING Line Wire

SOLD BY LEADING DISTRIBUTORS

WHO SELLS THE TELEPHONE DIRECTORY ADVERTISING FOR ALL THE DIRECTORIES OF THE SOUTHERN BELL TELEPHONE & TELEGRAPH COMPANY IN MISSISSIPPI?
ANSWER-
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Main Office: Telephone Building- Dayton, Ohio
Branch Office: P.O. Box 523, Jackson, Mississippi
Telephone: Adams 9124, L. D. Loop

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*

ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

NEWSLETTERS *on Alternate Weeks*

September 15, 1948

Dear Sir:

Following rehearing of Southeastern Tel. Co. application for increases in its rates & charges, Florida Railroad & Public Utilities Commission found that considerable improvement had been made in service & facilities since issuance of its May 28, 1948, order denying application, and granted in part company's application.

Commission specified in its rate increase authorization that: (1) rates & charges relating to DeFuniak Springs, and Madison, shall not become effective until exchanges have been converted to automatic operation; (2) no increase will be allowed for Valpariso, Niceville & Bonifay Exchanges but further consideration will be given to rates for these communities whenever substantial improvements have been made in service & facilities.

In its original order the commission found that company had failed to present separations of property, revenues, and expenses between intrastate & interstate business, & stated that commission was "without reliable data upon which it could determine to what extent, if any, toll rates or exchange rates or both should be increased to produce a fair & reasonable return." At rehearing, Southeastern Company took position that it would be impossible to make such separation in less than six months time & that its financial condition was such that it must have some relief before study could be completed. Commission ordered company to start a separation study & submit it within nine months.

* * *

In application filed with Federal Communications Commission, Carolina Tel. & Tel. Co., Tarboro, N. C., requested authority to acquire Columbus Tel. Co., Whiteville, N. C. Columbus company operates exchanges at Whiteville, Chadbourn, Tabor City & Hillsboro, N. C., servicing 1500 stations; purchase price of its facilities has been set at $110,000. Purchase by Carolina Tel. & Tel. has been approved by North Carolina Utilities Commission.

* * *

Steady pace of radio authorizations from FCC to power, electric & other utilities continues with nine grants being issued in last week of August, for total of 10 land stations & 79 mobile units. Grants went mainly to electrical cooperatives & companies. Also Rural Electrification Administration announced it had approved loans to six electrical cooperatives, portions of grants to be used for establishment of radio systems.

* * *

Latest issue of "Ohio Telephone News," published by Ohio Independent Telephone Association, contains message that deserves widest possible circulation. Article by Ohio Association's secretary Lloyd Wright states that owners of average small telephone company in Ohio now find themselves in unusual position. "For nearly 40 years," comments Mr. Wright, "until recently, they took care of all demands for service

rather promptly. Now their plants must be completely rebuilt at high costs, & demands for extensions of service must be met."

Stating that those who have not taken action to meet these needs are delaying the inevitable, Mr. Wright said that: Since the companies operate essential businesses & the state has given them the right to serve without competition and can transfer that right if service rendered is inadequate, companies should avoid such action by adopting & carrying out definite plans as to rates, records, and rehabilitation.

Mr. Wright commented that although a substantial number of companies have increased rates, "the new rates of far too few are anywhere near high enough, and the number which have taken no action whatever is surprising." "Today," he said, "subscribers do not criticize rates. It's the lack of modern equipment & service that's irritating. They are willing to pay the cost of furnishing a good grade of service and they are entitled to receive it. Rates sufficient to supply it should be obtained without further delay. And they can be."

* * *

New occupational hazard has popped up. Trenton (N. J.) State Supreme Court awarded Workmen's Compensation Act disability to Robert L. Grant; he had been punched by union official in labor-management parley.

* * *

Our Research Department, looking into basic metal shortages affecting telephone industry found domestic demand for copper, lead & zinc remaining active & in excess of U. S. mine supply. Munitions Board has announced its stockpile buying program for third quarter of current year. For three months -- July 1 to October 1 -- board proposes to acquire 30,000 short tons of copper, and 16,000 short tons each of lead and zinc. Metal industry members asked: "Where metal being sought would be obtained." Question applied in particular to lead & zinc where supplies have been adversely affected by strikes.

U. S. refined lead production in July totaled 40,458 tons against 47,227 tons in June, drop of 6,769 tons, which reflects St. Joe mine shutdown. Shipments also were affected, with domestic lead refineries delivering 40,853 tons of lead last month compared with 46,398 tons in June.

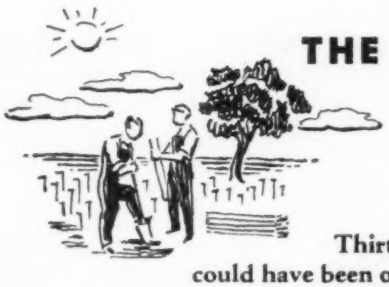
* * *

Highlights: S. A. Lane, pres. of Western Arkansas Tel. Co., announced new swbd. installation for Dardanelle, Ark.; cost estimated at $25,000....Paul Van Dalsem and L. O. Padgett purchased Perry County Tel. Co., Perryville, Ark.... L. E. Whiting, pres. of Meadville (Pa.) Tel. Co. announced completion of purchase of Crawford Tel. Co....Southwestern States Tel. Co. converting Moore, Okla., to automatic operation.

DeKalb Ogle Tel. Co., Sycamore, Ill., moved business & accounting offices to new building....George B. Krebs appointed mgr. Mt. Carroll (Ill.) exchange of Middle States Tel. Co....Fort Dodge (Iowa) Tel. Co. installing new underground toll cable between Fort Dodge & Iowa Falls. ...Glenwood Tel. Co., Roseland, Neb., installing underground cable system....Kenneth Crawford appointed mgr. Wabasha Tel. Co., New Richland, Minn....Nappanee (Ind.) Tel. Co. using voice recorder in connection with operator training.

Ray Smith

Ray W. Smith, Editor



THE CASE OF TAG

JW-68

Thirteen years ago, on a hot, humid day in Louisiana, two men could have been observed hard at work digging hundreds of small holes. Into each hole they sank a stake, bearing a metal tag. One of these tags read "JW-68."

Recently stake JW-68 was dug up and carefully examined. Thus the effectiveness of Chapman Penta Preservative was tested and proved . . . for this stake, today, after 13 years in the ground under the worst exposure conditions, is sound and free from decay and termite damage. Stake JW-68 had been impregnated with Chapman Penta Preservative, containing pentachlorophenol, which poisoned the wood so that both fungus growths and insects were killed when they tried to attack it.

Progressive utility companies have verified this splendid record of Chapman Penta Preservative by their own experience with Penta treated poles in their lines. In addition, poles treated with Penta Preservative are clean, dry, and well liked by their linemen.

You can gain these same advantages for *your* company, for the pentachlorophenol sold today is the same chemical exactly as that impregnated into stake JW-68, thirteen years ago. Be sure to specify Chapman Penta Preservative whenever you order treated poles and cross-arms.

CHAPMAN

CHAPMAN CHEMICAL COMPANY
DERMON BUILDING, MEMPHIS 3, TENNESSEE

P-L* EARTH ANCHORS

*REA APPROVED

P-L ALL STEEL, EXPANDING TYPE EARTH ANCHORS

Here is the first really efficient, two-piece earth anchor that is of simple, fool-proof, all-steel, heavy-duty construction. P-L Earth Anchors are exceptionally rugged and possess tremendous holding power. P-L Anchors can do a better job and can be installed quicker in all types of soil. Everyone from the engineer to the lineman can appreciate the ease of handling and installation.

EASY TO INSTALL

P-L Anchors come to you as assembled units. Built of two simple pieces of heavy steel plate. A few blows of the tamping bar and the sharp edged blades cut deeply and permanently into solid, undisturbed earth.

FOR LITERATURE WRITE

PIEPER-LILLARD INCORPORATED
ST. LOUIS 1, MO.

☆ *Advances in the Industry*

New Telephone Ideas

BY MYRLE SHAFER

NEW AUTOMATIC SWITCHING SYSTEM: Handling of messages on private-line teletype networks will be faster and more efficient in the future as the result of a new automatic switching system developed by the Bell Telephone Laboratories and scheduled for commercial installation soon.

Designed primarily for large private networks, the new system can handle automatically more messages for more teletype machines with more speed and accuracy than previous systems. While earlier types provided for only one switching office, and messages to be sent to only one machine at a time, the new system can have several switching points, each capable of sending messages to many individual machines simultaneously.

Dispatches can be sent from any sending teletypewriter to any other machine or group of machines in the network without manual handling other than the original perforation of the message tape. Switching operators—sending, receiving, switching, storing and intercepting—are entirely automatic, controlled by characters punched in the tape at the beginning and end of each message.

• • •

HELICOPTER LAYS & INSPECTS WIRE . . . The feasibility of laying telephone wire for military purposes by helicopter has been demonstrated by Signal Corps engineers through recent tests at the Signal Corps Engineering Laboratories, Fort Monmouth, New Jersey. The tests also demonstrated that helicopters could be used advantageously for the inspection of field telephone lines.

To determine the accuracy with which wire may be payed out, a course was plotted and a marker placed in an open meadow. Wire was then successfully laid within a yard of the marker and between trees separated by a few feet.

In another test, wire was laid across tree tops at the foot of a gully which had proved impassable for a wire laying crews and had been by-passed. As a result of the short cut the wire line was shortened approximately 25 per cent.

A flight to determine the value for maintenance purposes of line inspection followed several miles of laboratory test line at an average height of 40 feet, the pilot often descending to wire level to permit close scrutiny for breaks.

• • •

"SEAWAY" TELEPHONE SERVICE . . . With completion of a new mobile radio transmitter on a high hill near Duluth, mobile telephone service has been opened for both land and lake service in the Duluth vicinity. Referred to as "sea-way" telephone service, it will be useful to boats (nearby Lake Superior) as well as to cars. The antenna is located on a hill 720 feet above Lake Superior. A 132-foot steel tower gives an effective height of 152 feet above lake level. This gives a line-of-sight path of approximately 80 miles.

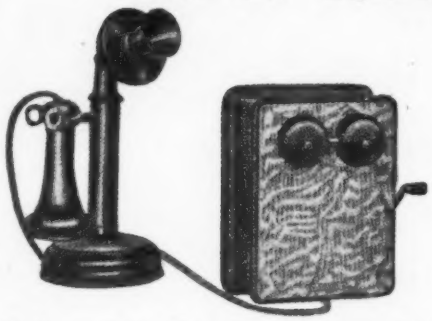
The initially installed channel will operate on 35.42 megacycles transmitting and 43.42 megacycles receiving at the fixed station. The mobile units will use the reverse frequency arrangement. These particular frequencies are used in place of the usual urban mobile frequencies (152-162 mg.) because of their ability to bend down into the valleys and to extend beyond the horizon which makes them more suitable for service in and around Duluth.

It is interesting to note that an Independent telephone company at Lorain, Ohio has been giving a very satisfactory radio service to ships plying the Great Lakes for a number of years. When it comes to "historic firsts" the Independent field have a few of their own, including the dial telephone.

SAVE MONEY WITH GUARANTEED REBUILT EQUIPMENT

THESE ITEMS ARE READY FOR PROMPT SHIPMENT

"LIKE NEW" EQUIPMENT

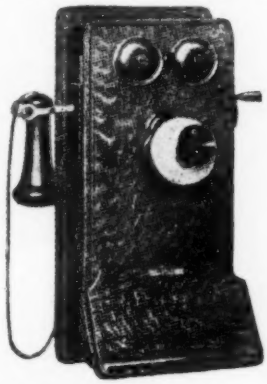


Guaranteed Satisfactory

Kellogg Desk Stand with Transmitter, Receiver and New Cords and
Ringer Box with Alnico Generator, Ringer and Induction Coil in new finely finished oak cabinet.

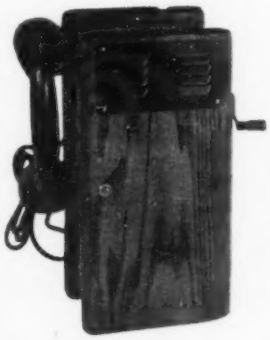
with 1600 ohm ringer, per set	$18.20
with 2500 ohm ringer, per set	19.70
Kellogg Desk Stand only	5.00
W. E. No. 1020 Desk Stand only	6.00
Ringer Box 1600 ohm	13.20
Ringer Box 2500 ohm	13.70

Wall Phones—Magneto



Short type, late model, new oak cabinet:

3 bar, 1000 ohm	$16.00
4 bar, 1600 ohm	17.00
5 bar, 1600 ohm	18.00



HANDSET WALL TELEPHONE

Alnico Generator, anti-sidetone coil, condenser and concealed ringer.

1600 ohm, each	$22.00
2500 ohm, each	22.50

Dan-Mac Conversion Kits

Modernize old style wall telephones with a handset in a few minutes—

New	$8.95
Rebuilt	7.25

"LIKE NEW" PAY STATIONS

No. 14J. Station for 5- 10- 25 cent coins with built-in signal transmitter, modern handset and cords $27.00

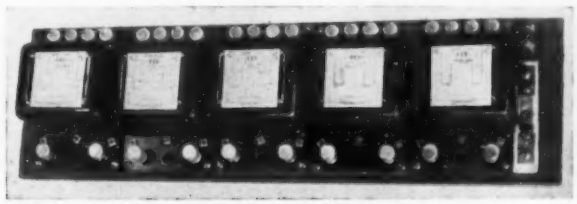
Ringer Box, Alnico Generator and Ringer, 1600 ohm..... 12.00
2500 ohm..... 12.50

No. 11. Pay Station for wall telephone, each 13.00

Ready for IMMEDIATE Shipment

Terminal block for desk set	each	.35
Handsets	each	7.50
Metal Battery Boxes, 2 cell	each	.90
Metal Battery Boxes, 3 cell	each	1.00

KICK COILS

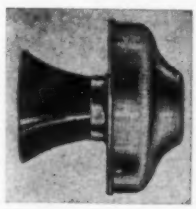


Dan-Mac Kick Coils for connecting C. B. Telephones to Magneto Switchboards providing modern private line service.

Single Coil, each	$ 4.00
Strip of 5 coils with battery circuit wired and fused, per strip	23.50

"LIKE NEW" PARTS

Receivers, Bakelite Shell and New Cord $1.85



Universal Receiver Shell and Cap (fits nearly all slip types), each....$ .55

Transmitters, Kellogg Local Battery or Common Battery with mouthpiece and back, each....$1.65

New Bakelite Mouthpieces, specify make of Transmitter, each ..... $ .20

In addition to NEW and LIKE NEW telephone equipment— We take pride in quick delivery of supplies

FOR DETAILED REFERENCE DATA See Our Listings and ADVERTISEMENT in the 1948 TELEPHONE BUYERS' DIRECTORY and COMPOSITE CATALOG

Order Today From

TELEPHONE REPAIR and SUPPLY COMPANY

DANIEL H. McNULTY, President and Manager

1760 Lunt Avenue Chicago 26, Illinois

The SALE that needs no "SELL"

There's no need to "sell" a man on re-ordering Masterphone—success and satisfaction with the first order always clinch subequent sales more solidly than any salesman could. And no wonder! For Masterphone's time-saving, profit-building benefits are the most convincing proof a telephone man could want.

Installation, for example, is unbelievably *easy!* Both wall and desk sets and dial or common battery housings are interchangeable on the same baseplate in a matter of moments. (Which means fewer parts to stock—and lower inventories than ever before!) Adaptations to any type of service are simple, too. No color-codes to remember, no soldering, no mess!

And *maintenance?* Never *faster,* never *simpler!* All components are mounted in full view for rapid inspection, with plug-in type condenser and induction coil. Ringers are of the same basic design for all phones, and the universal circuit is permanently wired and protected.

Performance? Masterphone's superior transmission and reception make a loyal booster of every subscriber. For the anti-side tone Triad circuit and controlled-response transmitter and receiver set new standards for finer telephony.

Join the growing list of telephone companies who are standardizing with Masterphone. Send *your* order for 1000 Series Masterphones to Kellogg *today!*

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KELLOGG SWITCHBOARD AND SUPPLY COMPANY

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D-1000 Desk Masterphone with dial on universal baseplate

1070 Desk Magneto Masterphone (Also in wall model)

1100 Manual Wall Masterphone

D-1000 Dial Wall Masterphone

1000 Manual Desk Masterphone

All Telephones shown above use same baseplate as D-1000 Desk Masterphone.

The Satisfaction Lasts
When You Buy Products

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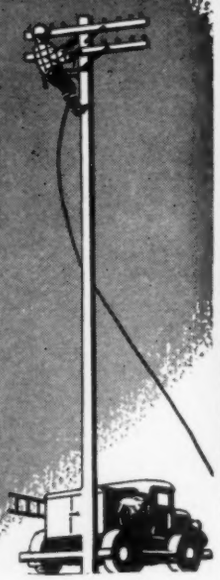
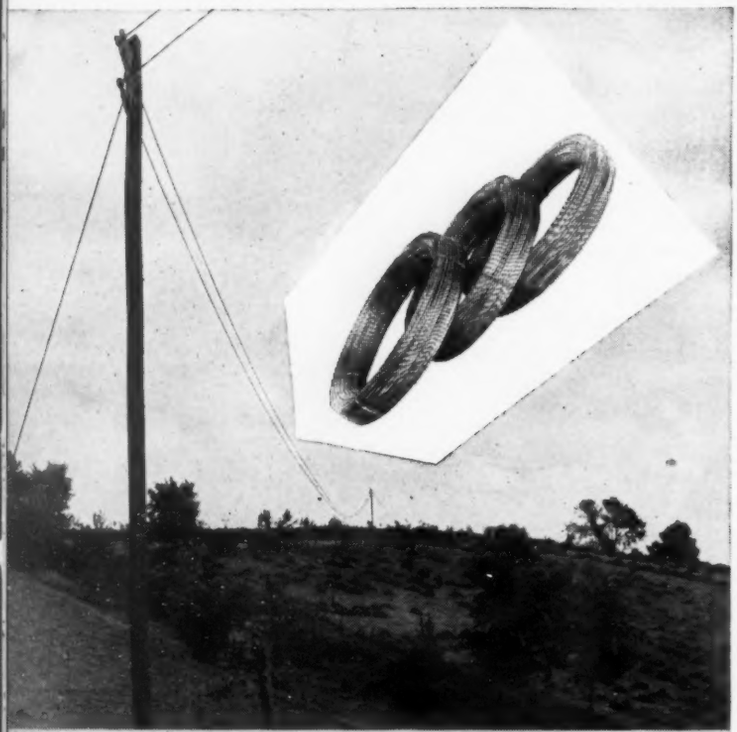
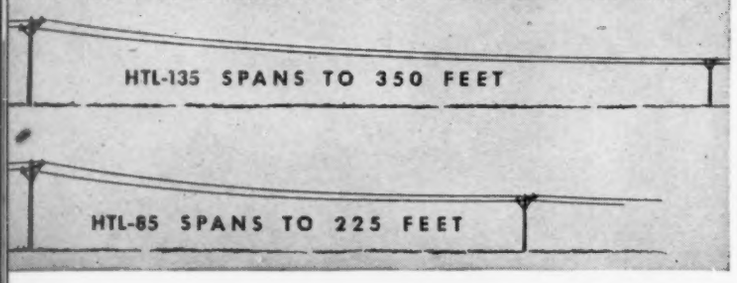


Save on Battery Replacements! Ray-O-Vac Dry Cells are ideally suited for telephone work because they're especially designed to resist deterioration when not in use. An internal protective coating, developed by the RAY-O-VAC COMPANY, extends their useful life. Means fewer replacements, fewer batteries to buy, lower maintenance costs!



PANS OF No. 12 B.W.G.– HEAVY LOADING DISTRICT



Save Two Ways—on line wire replacement and construction by standardizing on INDIANA STEEL AND WIRE CO.'S Crapo HTL-135 and Crapo HTL-85 Line Wire. Because of their high tensile strength, these wires permit long spans, enable you to realize substantial savings in construction and maintenance costs. Galvanized by the famous Crapo Process.

There's three-way satisfaction when you concentrate purchases of line supply and construction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 100 strategically located distribution points.

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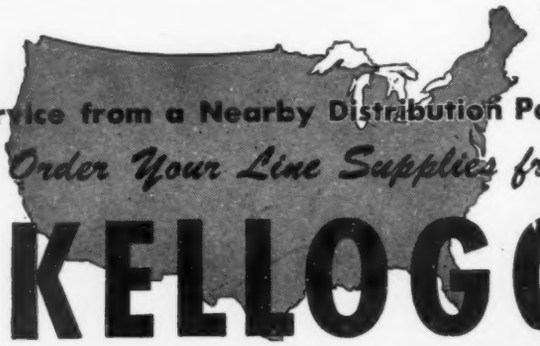

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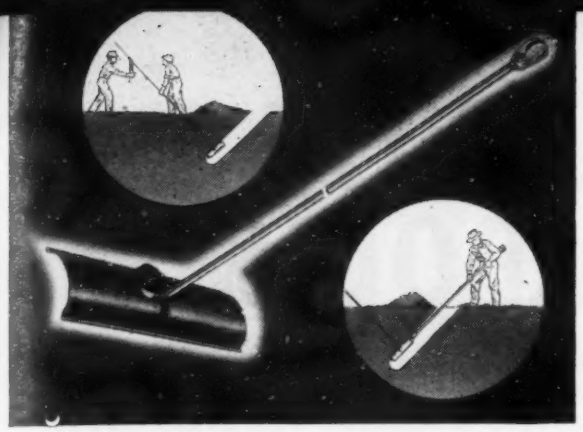
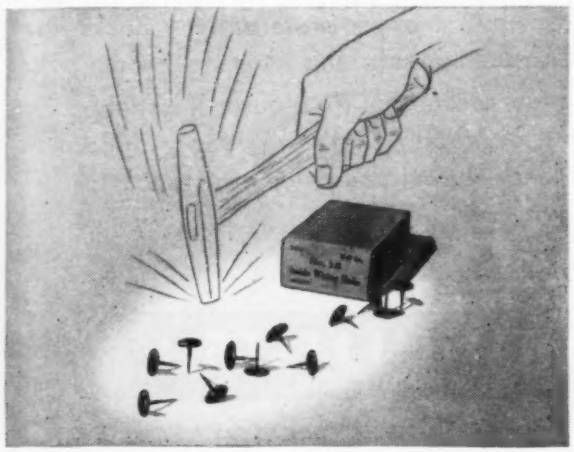
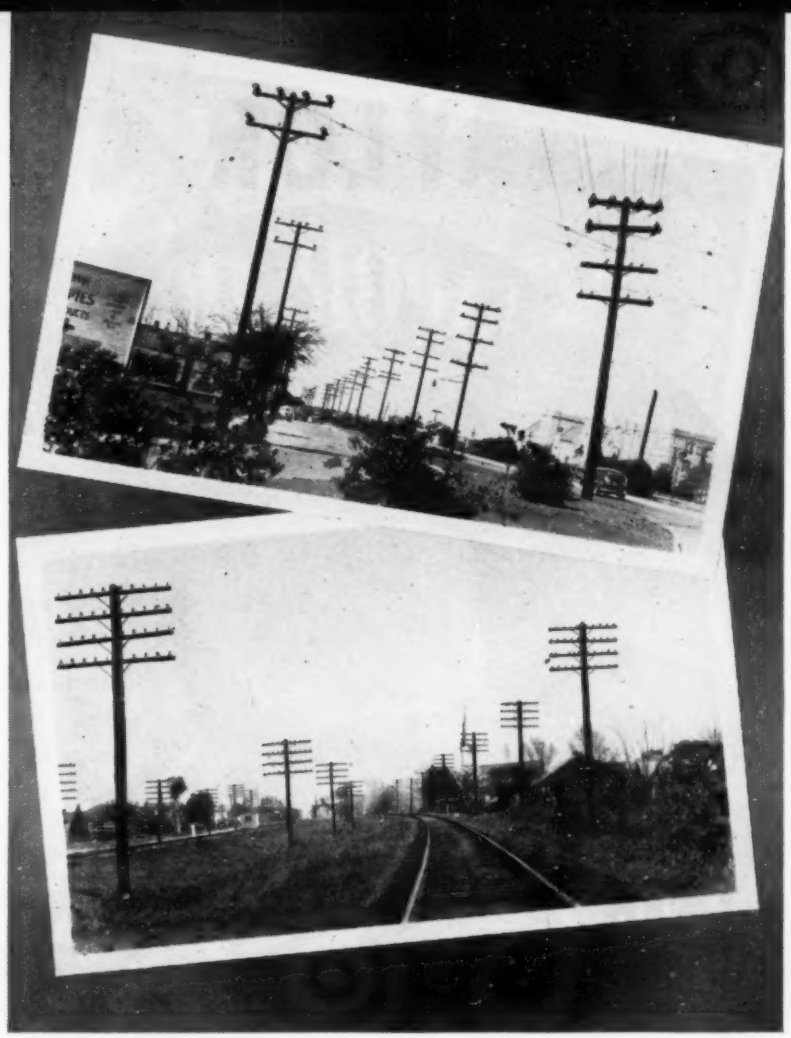


Poles Stay Put! Never-Creep Anchors are ideal for normal guying, because they pull against solid earth. Five easy steps install these A. B. CHANCE CO. Anchors: (1) Bore hole, (2) Drive rod, (3) Hang "Never-Creep" Plate, (4) Tighten Guy, (5) Fill in hole—and the job is done!

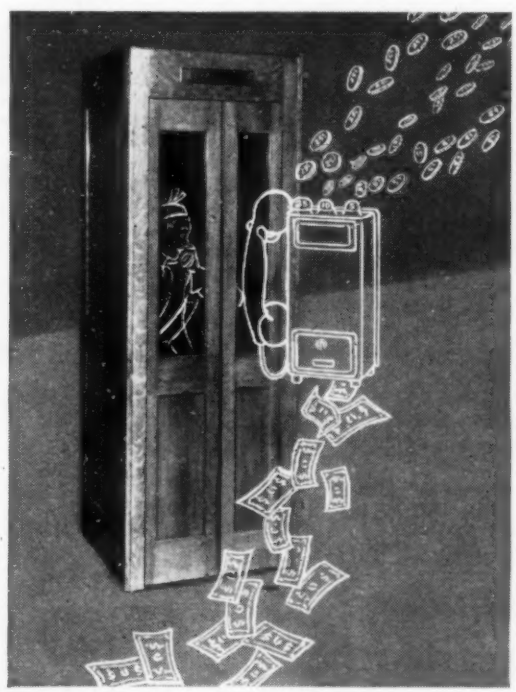


Why do it the hard way? Making neat installations is *easy*—with Rhodes Telephone Wiring Nails! Designed for telephone work with quality insured by rigorous driving, bending, withdrawing and immersion tests. Made by M. M. RHODES & SONS CO., in several colors and pin-lengths.



Long Life Expectancy—is built into pressure-treated Southern Pine Poles and Crossarms. Carefully and thoroughly treated by the AMERICAN CREOSOTE WORKS, INC., these poles have the extra durability required for dependable service under the toughest climatic conditions. For longer lasting, stronger poles, use "Pressure-Treated Southern Pine."

Durable and Silent. The Sub-Cycle Ringing Converter changes frequency without any moving parts. As a result, wear and consequent adjustment and maintenance are virtually eliminated. This LORAIN PRODUCTS CORP. static-type converter comes in several models.



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Sealed against Trouble! Communication equipment manufacturers demand Kester Plastic Rosin-core Solder, because it makes a perfect seal. Prevents high-resistance joints and intermittent open-and-closed circuits. Avoid trouble with KESTER SOLDER COMPANY solder.

TAYLOR COLQUITT POLES

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prevent bleeding loss—
are safe and clean to handle

Taylor-Colquitt vapor dried poles absorb and hold more preservative than steam-dried poles. Vapor drying scientifically prepares the wood for more even distribution of the preservative, checks bleeding, makes poles safe and clean to handle, and insures equal protection from outer shell deep down to the heartwood. That's why vapor-dried poles last so long—have such great resistance to decay and fungi.

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Reliable

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Reliable Cable Hangers are available in both Zinc and Copper, in Nos. 1 to 8 for cables ½" to 2⅞" diameter. ZINC—for supporting lead covered cable or insulated conductors to galvanized steel strand. COPPER—for supporting insulated wires or cable to copperweld and bronze strand. Specify RELIABLE and—as always—you get these Reliable features.

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Pressure treated for strength that lasts!

U·S·S Amertel lines

go up *faster*...stay up *longer*

WHEN you use long-span construction with high-strength Amertel wires, you can often cut your pole requirements by 50%. With fewer poles and fewer connections, lines go up faster with substantial savings in man hours and pole line equipment.

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COMPARISON

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135 grade	1213 lbs.	350 feet
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In addition to high strength, Amertel-85 and 135 wires have increased transmission efficiency at voice frequency. We will be glad to supply you with complete technical data on U·S·S Amertel-85 and 135 as well as the regular grades "E.B.B.," "B.B." and "Steel."

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To bring material into play
Thru' skill and know how,
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Tougher, since, we know not when!
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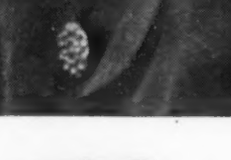
When SoundScriber Electronic Disc Dictation equipment is the recording medium, not only *what* is said, but *how* it is said becomes a matter of permanent record. This is extremely important, for speech intonation often carries more meaning than words. Telephone companies now using SoundScriber for voice training, monitoring, telephone recording, and routine business dictation were among the first to recognize this advantage.

And SoundScriber's *exclusive* DISCopying makes *duplicate* "live-voice" copies of the recording for confirmation, with the same desk-side convenience. *No other dictation instrument does this.*

The SoundScriber Corporation pioneered in developing practical telephone recording. The resulting achievement—clarity and naturalness of voice reproduction—is mainly responsible for SoundScriber preference by tens of thousands of business users . . . for machine dictation and for telephone recording.

Where permanent records of voice transmissions are required—whether for routine business dictation, telephone recording, monitoring, or voice training—forward-looking telephone companies would do well to investigate the many exclusive advantages and conveniences of SoundScriber equipment.



SOUNDSCRIBER
TRADE MARK

ELECTRONIC DICTATING AND RECORDING EQUIPMENT

Product of THE SOUNDSCRIBER CORPORATION
New Haven, Connecticut

EDITORIAL

Nature Takes It's Course

WE dislike to disturb your enjoyment of the fine Fall weather we hope you are having, but we wish to paraphrase a statement made long ago by a poet named Shelley, who said "If Winter comes, can Spring be far behind?"

Our version is: "When Autumn comes, Winter is not far behind."

To put it more plainly, it's time to be going out and doing preventive maintenance against the rigors of the winter that we know is on the way. It is a lot easier, pleasanter and incidentally, cheaper, to do what can be done now to prevent a break than it is to fix it, usually on an emergency basis, when the temperature is around zero and a cold wind is whistling through your hair.

This proposition of preventive maintenance is one of the few ways left in this era of high costs, by which a telephone company can economize and, at the same time, improve its service. It is good management, making use of foresight instead of hindsight.

We know, of course, that all our winter-time plant troubles cannot be forestalled by preventive maintenance, particularly if we experience a winter as severe as the last. But we also know that a plant put in as good shape as possible by preventive maintenance will better withstand the rigors of winter than one that has not had that attention.

This difference—excepting for the inconvenience it caused—was not as important in past years as it is now. Today it is exceedingly important from the standpoint of cost alone. Repairs that must be made on an emergency basis, which means regardless of cost, are tremendously expensive nowadays. A job as simple as that of repairing a break in a company-owned farm line is a costly operation under present-day conditions, when it must be done on an emergency basis.

Preventive maintenance is about the cheapest kind of maintenance possible. It can be done at the company's convenience, in pleasant weather, sandwiched in between more urgent jobs, and carried out by methods which allow the matter of cost to be given full consideration. It is a type of insurance against far greater costs and inconvenience to both company and subscribers, later on.

Some far-sighted telephone managements carry on what is practically a year-around program of preventive maintenance, by using man-power, when available from other work that must be done on schedule, for preventive maintenance work when weather and other conditions are suitable. Some smaller companies set aside a period of the year—usually in the Fall when weather conditions are good—for special attention to preventive maintenance. But, by whatever method it is done or however it is scheduled, the results of preventive maintenance are good. Not only does it save money, but it also helps considerably to maintain good service when otherwise service interruptions might be seriously inconvenient to both subscribers and the company.

Preventive maintenance won't prevent all telephone plant troubles, of course. But it does prevent many that would have happened if the maintenance had not been done. "A stitch in time . . ." may save more than nine if the telephone plant has been given the benefit of preventive maintenance.

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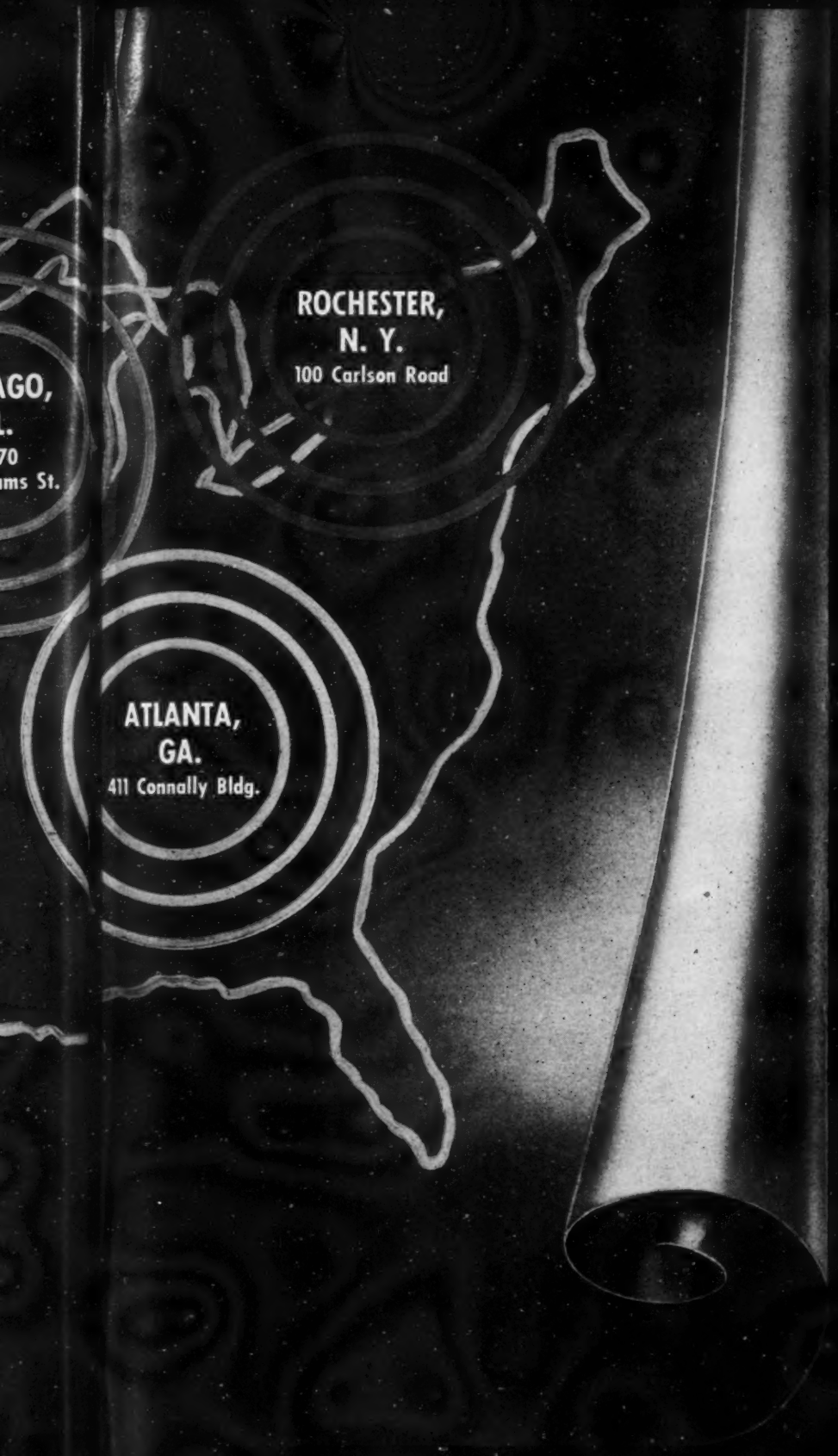

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A modern research laboratory with pilot manufacturing plant where advance-design batteries are constantly created—and proved before production.

The Metalloscope, a combination high-powered microscope and camera, is helping Gould scientists find the answers to age-old lead casting problems. With it, the complex crystalline structure of lead castings has become an open book. As a result, information rapidly becoming available points the way to even stronger, electrically more efficient grid frames, posts, straps and connectors. For better batteries always, choose GOULD—FOR FIFTY YEARS THE CHOICE OF ENGINEERS.

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Always Use Gould Automobile and Truck Batteries

Telephone News Briefs

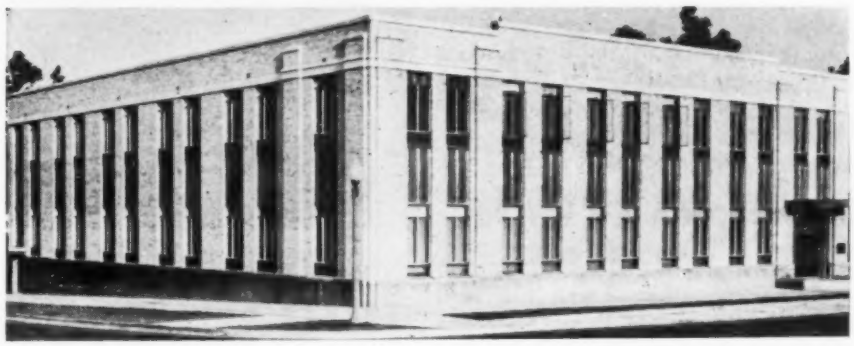
Oral Arguments Start Oct. 6 On Mobile Service Rules

The Federal Communications Commission announced August 26 that it will stage, beginning October 6, oral argument on its nine proposed rules for the different classes of mobile radio services which it had issued last mid-June.

The FCC, because of the multitude of comments on the proposed rules and requests for appearances, decided on the oral argument procedure with questioning confined practically to the commissioners to hold down the sessions to a reasonably short period. It had been anticipated throughout the mobile radio manufacturing industry as well as by the numerous services affected that the FCC would schedule hearings on the all-important proposals of the commission, setting up new rules governing frequency assignments, operational requirements and equipment standards of the non-broadcast services.

It was also understood authoritatively that, wherever feasible, the FCC will request that only attorneys present argument for the various services. However, the commission has taken under consideration the fact that some services, such as police, fire and other municipal radio users, do not have the organizational authority nor means to provide legal counsel in their behalf and it is anticipated that in a number of instances engineers or other representatives of user groups will be allowed to take part in the October 6 proceeding.

Chiefly concerned in the October 6 proceedings are the Bell System and Independent telephone companies in their development of public mobile telephone services and other radio facilities; land transportation services such as taxicabs, railroads, transit vehicles, and intercity buses and trucks; industrial radio services for power, petroleum, forest products and other commercial or industrial operations; and public safety services covering police, fire, special emergency, forestry-conservation and highway maintenance. FM and TV broadcasters are also expected to renew allocation arguments.



New, modern dial exchange building of Two-States Telephone Co., Texarkana, Tex.-Ark., was formally opened August 30 (Cutover story appears on page 88).

Illinois Consolidated Tel. Co. Borrows $500,000 for Improvement

Illinois Consolidated Tel. Co., Mattoon, Ill., announced August 31 that it had borrowed $500,000 from the Mutual Life Insurance Co. to aid in financing its construction-improvement program in its territory. The loan was on 3¼% first mortgage bonds due in 1975. The Central Republic Co. was the negotiating agent.

Linn, Mo., Cutover to Common Battery

A new common battery system has been placed in service at the Linn, Mo. exchange of the Ozark Central Telephone Co.

The new board has a 500-line capacity. C. F. Carroll, district manager, said that there are at present 250 of these installed, with another 250 in reserve.

Michigan Association Holds Annual Convention Sept. 23-24

At a meeting of the Michigan Independent Telephone Association's board of directors in Lansing on August 6, the board approved tentative convention plans submitted by president L. W. Reynolds. Governor Kim Sigler will open the program with an address of welcome at the first general session which will be called to order at 10:30 A.M. on September 23. The program includes many other prominent speakers from the public utility field whose addresses will be interesting and instructive. The banquet will be held in the Grand Ballroom of the Olds Hotel on the evening of the second and last day of the convention.

Inter-Toll Dialing Equipment for Tecumseh, Neb.

The first step by the Lincoln, Neb. Telephone & Telegraph Co. toward integrating its long distance facilities in the nation-wide toll dialing program was initiated recently with the ordering of special inter-toll dialing equipment for installation at Tecumseh.

C. C. Donley, general traffic superintendent, in making the announcement explained that the company's plan in its first phase is expected to be completed late next year. It will permit long distance operators at Lincoln, Beatrice, Nebraska City, Falls City and Auburn to dial subscribers direct at Tecumseh, Adams, Sterling, Burr Cook, Crab Orchard, Elk Creek, Johnson, Burchard and Table Rock. It also will permit Tecumseh operators to dial subscribers direct at Lincoln and other dial exchanges reached via Lincoln such as Plattsmouth, Seward, Elmwood and others.

C. P. Cooper Retires From A. T. & T. Co.

Charles P. Cooper, vice chairman of the board of Directors of the American Telephone & Telegraph Co., retired at his own request on September 1 after more than 40 years of Bell Sys-

tem service. For 20 years beginning in 1926, Mr. Cooper was vice president of the company in charge of finance. He became executive vice president in 1946 and vice chairman of the board in February of this year. He began telephone work with the New York Telephone Co. as a junior engineer, and rose from the ranks to become president of the Ohio Bell Telephone Co. in 1923, 3 years before he was made financial vice president of A. T. & T. Mr. Cooper continues as a member of the board of directors of the company. He is president of the Presbyterian Hospital in New York and chairman of the finance committee of the New York Heart Association.

Phalen Elected A. T. & T. V. P.; McHugh in Charge of Finance

Clifton W. Phalen, who has been vice president of the New York Telephone Co., was recently elected a vice president of the A. T. & T. Co. and appointed in charge of public relations. Mr. Phalen, who was born in Washington, D. C. and graduated from Yale University, began his Bell System career 21 years ago in the plant department of the New York Telephone Co. at Syracuse. Following work as a lineman, cable splicer, installer and repairman he was made a district chief in 1929. He rose to the position of assistant vice president of the New York company in 1943 and in 1944 was elected vice president.

Keith S. McHugh, who has been vice president of the A. T. & T. Co. in charge of public relations, was appointed in charge of finance. Mr. McHugh started in the A. T. & T. Co. as a clerk in 1919. He became commercial engineer of the Chesapeake and Potomac Telephone Company in Washington, D. C. in 1921 and general commercial manager of the New York Telephone Company's upstate area in 1925. He was elected vice president in 1929. He returned to the A. T. & T. Co. as commercial engineer, then became assistant vice president and was elected vice president in 1938. He has been in charge of public relations since 1946.

Michigan Independent Votes to Sell Property

Stockholders of the Tuscola Farmers Telephone Co., Millington, Mich., have authorized the sale of the business, subject to the approval of the Michigan Public Service Commission, to W. H. Nickless & Son, Bay City, according to an announcement by Norman Kurpsel, secretary and manager.

LAURANCE G. WOODFORD
Retired August 10 as general manager of the Long Lines Department of the American Tel. & Tel. Co.

HENRY T. KILLINGSWORTH
Recently appointed general manager of the Long Lines Department of the American Tel. & Tel. Co.

The company was organized 35 years ago and now has 600 subscribers. Other officers and directors are: President, Frank Koch; treasurer, Elmer Case; Frank Jensen, Elmer Kurpsel, Henry Forsyth, and Arthur Kerr.

FCC Telephone Industry Statistics for 1946

The FCC's annual publication, "Statistics of the Communications Industry in the United States," for the year ended Dec. 31, 1946 is now on sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Colorado Governor Inaugurates Telephone Recording

From the State Capitol at Denver, Colo., the Honorable Lee Knaus, governor of Colorado, conversed on August 30 with Herbert Gfroerer, chairman of the board of The Sound-Scriber Corporation in New Haven, Conn., to inaugurate regularized telephone recording effective in Colorado. Governor Knaus placed this cross continent call as the official beginning of telephone recording service in Colorado, as regularized by the Colorado Public Utilities Commission and the Federal Communications Commission.

Governor Knaus lauded the valuable service which telephone recording affords government, industry and business, and the function of this practice in drawing together more closely the various sections of the United States.

During the conversation, Mr. Gfroerer spoke with Governor Knaus about the role which SoundScriber played in the regularization of telephone recording, which dates back to the beginning of World War II, when the installation of SoundScriber telephone recording equipment began in the Navy and War Departments and in war industries. "In its early days," Mr. Gfroerer said, "telephone recording was a vital factor in speeding the war effort."

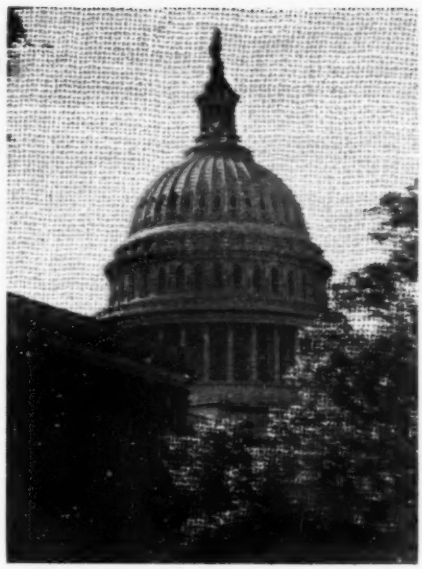
Mr. Gfroerer advised the governor that the original recording, which was being made in New Haven, would be forwarded to the State Capitol for presentation to the Colorado Historical Society. A live-voice copy of the telephone conversation will likewise be forwarded for Governor Knaus to include among official documents.

All during the conversation, the now-familiar "beep" tone was heard, signifying that the conversation was being recorded. This tone is prescribed by the Federal Communications Commission in all cases where phone conversations are being recorded.

Carolina T. & T. Purchases Columbus Telephone Co.

Carolina Telephone & Telegraph Co., Tarboro, N. C., received authority from the North Carolina Utilities Commission to purchase the telephone plant and property of the Columbus Telephone Co. The Columbus company owns and operates exchanges at Whiteville, Chadbourn, Tabor City and Hallsboro, with toll pole routes between the exchanges.

According to the commission, facilities of the Columbus company require considerable expansion, repair, rebuilding and improvements which the company is financially unable to effect.



Washington Bureau REPORTS

BY ROLAND DAVIES and FRED HENCK

Third Round Wage Demands

MIDSUMMER doldrums and the intense heat waves affected practically all news developments in the National Capital with regard to the telephone industry recently except for the activities of two major telephone labor union groups which were marshalling their forces for a third round wage increase drive in the fall.

As has been previously pointed out in this column, the joint CIO-CWA program to storm the "citadel" of the Bell System in bargaining and reopening of the wage issue, starting at full peak in mid-September, disregarded the heat wave and the union headquarters of both labor organizations worked feverishly in Washington despite temperatures.

The fusion of forces on the part of the unions reached their climax in a meeting the latter part of August when the top officers of telephone labor organizations, claiming to represent approximately 425,000 employees in Bell System and Independent companies, as well as Western Electric and Bell Telephone Laboratories, mapped out a joint action program. This was to be intensified with a second gathering on Sept. 10. Even a larger group of union representatives than those present for the August meeting, when the top officers of the Communications Workers of America, the CIO Telephone Workers Organizing Committee, and 13 unaffiliated unions from New York, Pennsylvania, Maryland and Ohio assembled, was slated for the meeting.

The drive will produce several developments, it is anticipated. The CWA-CIO leadership undoubtedly would like to achieve a nationwide wage pattern in the Bell System, even though they claim that such an ambition is not in the cards. But, just as important, is the growing atmosphere of fusion between the CWA and the CIO so that a number of observers predict that the independent CWA will become a part of the CIO as a separate international union after all the bargaining "shooting" is over. That will be the thing for the entire telephone industry management, Bell System and Independents, to watch as undoubtedly such a merged labor organization would have plenty of power even though there might be a new political administration in Washington.

Recorder Tariff Filing With FCC

FILING with the FCC of rates for telephone recorder-connecting equipment used in interstate message toll service would "violate fundamental principles of the division of jurisdiction to regulate telephone rates between (the FCC) and the state commissions," the Bell System companies keynoted in a recent statement filed with the FCC.

The statement was in response to a letter from the federal agency asking why the Bell System companies had not filed tariffs with the FCC relating to the use of the device in interstate traffic.

The Bell System answer, submitted by Attorney John T. Quisenberry, emphasized the jurisdictional precedents relating to the FCC's regulation of interstate toll rates and the state commissions' purview of exchange and intrastate toll service. It is noted that exchange facilities have been used jointly and indiscriminately by the telephone subscribers since the early days of the business for local, intrastate toll, and interstate calls, particularly the telephone facilities located on the subscribers' premises. "This joint use of facilities is the most efficient, economical, and convenient way to render telephone service," the statement pointed out.

The Bell System companies are convinced that recorders will be used for all types of service, Mr. Quisenberry said, and that "the only arrangement which will be satisfactory to subscribers . . . and can be effectively administered by either the telephone companies or the regulatory authorities is an arrangement under which the recorder can be used by the subscriber on any of his calls without regard to whether they are interstate, intrastate, exchange, or toll. The Bell System companies consequently extended to recorder-connecting equipment the joint use arrangements long in effect for all other equipment on the subscriber's premises . . . "

The difference in structure of exchange and toll rates was emphasized by the statement, with the point that "Equipment charges are made on account of such items as extension telephones, private branch exchange switchboards, additional trunk lines and other items and must be paid by the subscriber for the exchange service of which they are an integral part. Toll service on the other hand is charged for entirely on a per call basis under a schedule of message toll rates which applies uniformly and without regard to the particular equipment used."

The separate patterns have repeatedly been approved and prescribed by state commissions, and toll rates filed with the FCC have never varied because of subscriber equipment used, the statement brought out. When the toll rates filed with the FCC were put on a station-to-station basis in March, 1943, Mr. Quisenberry recalled, the tariffs were amended to include the statement that "The toll service charges specified in this tariff are in payment for all service furnished between the calling and called telephones."

In publishing the equipment charges in exchange tariffs only, the statement said, the Bell System companies believes that present rates for interstate toll service cover the interstate use of recorder-connector equipment "just as they long have covered and now cover the interstate use of extension telephones, private branch exchange switchboards, and all the other items of equipment" included in exchange equipment charges.

If it is argued that exchange rates be filed with the FCC because a

(*Please turn to page* 80)

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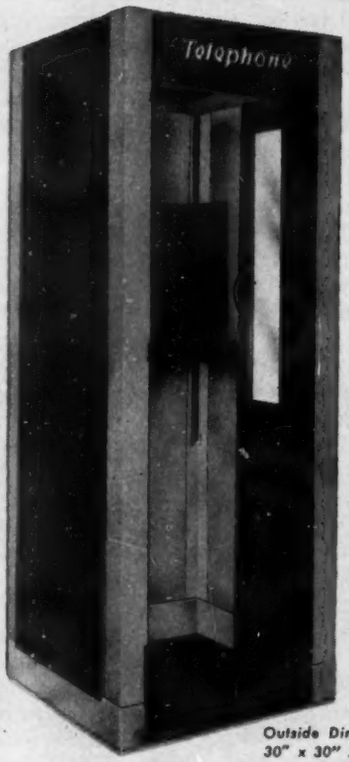

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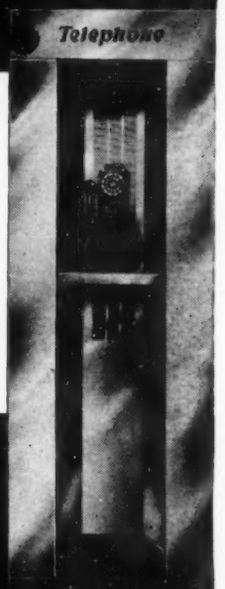

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THE MARKETS for NEW CAPITAL

By ALBERT W. KIMBER

BATTLES between sellers and buyers of new security issues became increasingly frequent this summer, and the sellers almost invariably lost. But that does not mean that the buyers always won, for nobody wins a war. Some of such contests occurred in the field of electric utility preferred stocks; some of the most significant were the following:

(1.) Public Service Electric & Gas on July 8th offered for competitive bidding 200,000 shares new preferred. Bids were submitted by two banking groups, one of 101.65 for a $4.40 dividend, the other 100.55 for a $4.50 dividend. Company refused to consider them and subsequently reoffered the stock, receiving on August 4 two bids from the same groups as before. The high bidder on the first offering now bid 100.90 for a $4.50 dividend, and the previous low bidder repeated its bid of 100.55 for the same. Company again rejected both bids, and asked the Securities and Exchange Commission for permission to sell the stock on a negotiated underwriting, which the commission granted. In Wall Street it is freely said that because of current market conditions and price trends company will do no better in private negotiations than it could have done on the public bidding.

(2.) Northern States Power of Minnesota on July 14 offered for competitive bidding 200,000 shares new preferred stock. Company's outstanding $3.60 preferred, sold to public in August 1946 at 102.75, was then selling on the New York Stock Exchange at 83, a 4.34% dividend yield. On the new stock company received two bids, both for a $4.80 dividend, one was 100.7599, the other 100.57. Company rejected both bids and readvertised the stock for August 10. On that day it again received two bids, the higher 100.81 for a $4.80 dividend, which the company accepted. The winning group had intended to resell at 103.20 to yield 4.65, but before the offering August 12 reduced the price to 102.00, a 4.70% yield. The new stock moved out slowly, syndicate was not closed until August 27.

(3.) Consumers Power Company (Michigan) sold at competitive bidding June 22 an issue of 200,000 shares new preferred stock at 100.8991 for a $4.52 dividend. Company's outstanding $4.50 preferred was then selling on the New York Stock Exchange at 104, a 4.33% dividend yield. The new stock was offered to the public June 24 at 102.725 to yield 4.40%; the syndicate was held open for a month; when it closed July 23 more than half the shares were still unsold and in the open market the stock was bid as low as 97½. It has since recovered to 99.75 bid, a price still below what the bankers paid for it. This issue was sweetened with a purchase fund to buy 2% of the original issue, or 4,000 shares per annum, in the market or upon tender at not exceeding the initial offering price.

(4.) Kansas City Power & Light in June sold at competitive bidding 80,000 shares of new preferred stock. Company's outstanding $3.80 preferred was then selling on the New York Stock Exchange at 98, a yield of 3.88%. The new issue was awarded on a bid of 100.271 for a 4% dividend. The syndicate expected to reoffer the shares at 102.50 to yield 3.90%, but before the offering reduced the price to 101.25 to yield 3.95%. This preferred was also provided with a purchase fund of 2% of the original issue, or 1,600 shares per annum, to be bought at not exceeding the initial offering price. The stock moved out very slowly, and is now quoted 94.00 bid, a 4.25% yield.

Preferred Stocks

TELEPHONE companies have made comparatively few offerings of preferred stock since the beginning of the year, and they have been in smaller amounts than most electric utility preferred issues (*See Table 1*). but the telephone companies have been more realistic in pricing them, and more successful in placing them. One company actually made some progress against the downtrend in prices: Associated Telephone Company Ltd. sold to the public last April 75,000 shares of its 5% preferred, $20 par, at $21 per share to yield 4.76%; in August the company sold another 75,000 shares of the same stock at $21.25 per share to yield 4.70%. None of the telephone preferred issues was subject of competitive bidding, all of them were arranged in private negotiations, and none of them was provided with a sinking fund or purchase fund.

Some important points may be noted from all the foregoing. The first is that the trading market price of a preferred stock has no mathematical relation to the price at which a comparatively large new preferred issue of the same company can be successfully placed; the big questions are, who will buy the new issue, and what will they pay? The second

point is that a sinking fund or purchase fund will not sell a new preferred if prospective buyers consider the price too high. The third point is that preferred stock money now costs a utility more than formerly. Two years ago it was possible to sell the higher grade preferreds at prices to yield from 3.50% to 4.00%, but that was when the investment funds of colleges and other institutions except life insurance were being switched from bonds into preferreds because of the extremely low yields on bonds which were being offered in refundings. And the life insurance companies were actively buying them. Today they are not. Thus far in 1948 these companies have invested less in preferreds than they did in the same period last year; in the first six months of 1948 a total of $126 million against $184 million in the first six months last year (these figures include some industrial issues.) One of the big five is completely out of the preferred stock market, will not buy any, and the others have become extremely selective.

Reasons for this are obvious. Some life insurance companies portfolios already include all the preferred stocks they can legally hold, so for the time being they cannot buy more. Then there are the book losses that have been taken on some of their holdings.

A life insurance company, as a rule, may carry the bonds in its portfolio at their amortized value, but must carry preferred stock at market. In the records before him the purchasing officer notes that Birmingham Electric $4.20 preferred bought in January 1947 at 100 is now selling around 82, Indianapolis Power & Light 4% preferred bought in April 1946 at 102 now at 90, Pennsylvania Electric 3.70% preferred bought in June 1946 at 102½ now at 85. He wonders how far this trend will continue, for utility preferred stock prices are influenced in some degree by money rates, and most authorities agree that money rates are going higher. And a telephone or electric utility preferred issue of substantial amount cannot now be successfully placed at either public or private sale unless the life insurance companies or other institutional investors with available funds buy a large portion of it.

Common Stock

THE FIELD of common stocks presents an entirely different and much more encouraging picture. Telephone and electric utilities thus far in 1948 have made more numerous issues of common stock, and raised more new capital from them, than they have done with preferred. And, contrary to what seems to be the general impression, common stock money has not lately been costing them any more than it did earlier in the year.

Few companies have made more than one issue of common during the period. Of Detroit Edison common, 450,000 shares were sold in January at 20.50 for account of its "parent" American Light & Traction; in April another 450,000 shares were sold at the same price; in August a further 190,000 shares at price of 20.833 to the public. On the 20.50 price the dividend yield was 5.85%.

Some common stock issues have been successful. Pacific Gas & Electric in March offered to its stockholders 686,953 new common shares at price of 25 when the market was around 31 (dividend yield 6.45%). All but 16,098 shares of the new issue were taken up. Peninsular Telephone in April offered to stockholders 35,374 new common shares at 37.50 yield 6.66%, when the stock was selling on the New York Curb Exchange around 42-43. All but 842 shares were taken, and this little remainder was bought by officers and employees of the company. General Telephone Corporation in June sold 208,260 shares new common stock, $20 par, at price to public of 25.125.

By contrast Mountain States Telephone in March offered 191,881 shares additional common stock at par, $100. The allotment to the parent company American Telephone was 140,750 shares and this was

A. W. KIMBER Starts Exclusive Series On "Financing" For TE&M Readers

A. W. KIMBER

MANY members of the Independent telephone industry heard A. W. Kimber address the 1948 Executives' Conference of the United States Independent Telephone Association, and read his complete address on "Financial Problems Of The Telephone Industry" in the May issue of FORTNIGHTLY TELEPHONE ENGINEER. Starting with this issue Mr. Kimber's valuable interpretations of present day financing will appear exclusively in TELEPHONE ENGINEER and MANAGEMENT.

We are proud to have the privilege to present Mr. Kimber's helpful articles to our readers. Mr. Kimber is a financial consultant with offices in Washington, D. C., and is nationally known as a security analyst and securities market analyst—lines of work in which he has been engaged for more than 30 years.

Prior to coming to Washington in 1942, Mr. Kimber was associated with prominent underwriting bankers in New York where his work included the determination of the terms and conditions of issue of new securities and the prices to be bid for them. From 1919 to 1928 he was lecturer in finance in New York University, delivering each year two post graduate courses in security analysis.

In recent years Mr. Kimber has been engaged chiefly in electric and telephone utility rate cases and in the valuation of securities for purposes of original cost proceedings, mergers and recapitalization and for estate taxes.

Mr. Kimber is constantly in close touch with the markets for new security issues in New York and elsewhere throughout the country, and his interpretations of market conditions, suggestions and advice will, we feel sure, be of immense value to readers of TELEPHONE ENGINEER And MANAGEMENT.

taken up; there remained 51,131 shares for other stockholders, but of these only 6,911 were taken. At the time of offering the company was paying dividends at the reduced rate of $5.00 per share but restored the former $6.00 rate with its July 15th payment. In June Pacific Telephone & Telegraph offered 601,262 shares additional common at par, $100; after American Telephone took up its allotment of 520,649 shares there remained 80,613 shares for other stockholders, but of these only 16,376 shares were taken up. Company at the time was paying dividends of $6.00 per share. But in both cases the margin of earnings protection for the dividend was not large enough to satisfy the requirements of investors. The untaken shares were withdrawn from registration, not offered to the general public.

Bonds and Debentures

NEW CAPITAL obtained by the telephone industry thus far in 1948 has been more in the form of bonds and other debt, less in capital stock, either preferred or common or both. The same rule is true of utilities generally: for new capital only they sold in the first six months $1,200 million of debt instruments as against $216 millions in equity securities. The amount of debt issues was double what it had been in the first half of 1947. Some of the results of these transactions are important.

The Bell system last year obtained through issue of securities $1,147 million new capital, and most of this was in debt, so that the proportion of debt in the system capital structure increased from 37.8% on December 31, 1946 to 48.4% at the end of 1947. To date in 1948, despite substantial conversions of parent company debentures into stock, with consequent increase in stock and decrease in debt, subsidiary companies have sold such large amounts of bonds ($465 million) that the debt ratio of the system is now 50.1%. The class A independents had a debt ratio combined at the end of 1946 of 44.3%, which increased in 1947 to 47.7%, but although complete figures are not available on a comparable basis they seem to have sold enough preferred and common stock so that their debt ratio has not increased much if at all in 1948 to date.

Prices realized by the companies on offerings of new telephone and electric utility bonds have shown an almost steady decline over the last year or so. New York Telephone in July 1947 sold $125 million refunding 2.75% 1982 at 103 to yield 2.62%, and in June 1948 another $90 million refunding 3% 1981 at 101.125 to yield 2.95%. Pacific Telephone & Telegraph in October 1947 sold $100 million debs. 3.125% 1987 at 101.25, yield 3.05%, and in March 1948 $75 million debs. 3.25% 1978 at 102.75, yield 3.10%. California Water & Telephone in November 1947 placed $1 million of 3% 1971 at 98.50 to yield 3.10; this last August placed another $1 mil-

(*Please turn to page* 81)

Table One—Telephone Company New Capital Issues 1948

Bonds and Debentures	Amount	Price	Yield
January			
Lincoln Telephone & Telegraph—1st 2-¾% 1976...	$ 1,000,000	96.20	2.95%
New York Telephone—1st 3-⅛% 1978.....	60,000,000	101.43	3.05%
Western Light & Telephone—1st 3-⅛% 1977.....	1,250,000	100.50	3.10%
March			
Pacific Telephone & Telegraph—3-¼% debs, 1978...	75,000,000	102.75	3.10%
Southern New England Tel—3-⅛% debs 1978.....	15,000,000	100.486	3.10%
April			
Associated Telephone Co., Ltd.—1st 3.125 D 1977...	700,000	100.00	3.125%
California Water & Tel—S.F. 3.75% debs. 1968.....	1,000,000	100.00	3.75%
La Crosse Telephone Corp.—1st 3.375% 1978.....	340,000	100.00	3.375%
Mountain States Tel & Tel—3.125% debs 1978.....	25,000,000	100.875	3.08%
Southwestern States Telephone—1st 3.625%.....	1,000,000	Private sale	
May			
Southwestern Bell Telephone—3.125% debs 1983....	100,000,000	102.50	3.01%
West Coast Telephone—1st 3-½% 1971.....	1,000,000	Private sale	
SF 3.75% debs 1963.....	500,000	Private sale	
Winter Park (Fla) Telephone—1st 3.50% 1978.....	200,000	101.50	3.43%
June			
Illinois Bell Telephone—1st 3% B 1978.....	60,000,000	102.75	2.85%
New York Telephone—Ref. 3% F 1981.....	90,000,000	101.125	2.95%
Carolina Tel & Tel—3.125% debs 1978.....	4,000,000	102.46	3.10%
July			
Norfolk & Carolina Tel & Tel—1st 3.50 A 1973....	600,000	Private sale	
Batesville (Ind.) Telephone—1st 4-½% 1973.....	200,000	100.00	4.50%
New Jersey Bell Telephone—3.125% debs 1988.....	55,000,000	103.125	2.99%
August			
Lincoln Tel & Tel—1st 2.75% A 1976.....	1,000,000	96.20	2.95%
California Water & Telephone—1st 3.25% 1971.....	1,000,000	100.00	3.25%
Illinois Consolidated Telephone—1st 3.25% 1975...	500,000	101.00	3.20%

Preferred stocks	Number of Shares		
March			
Pennsylvania Telephone Corp.—$2.25 Cum., no par	40,000	50.00	4.50%
April			
United Tel. Co., Inc., (Ind.)—5% pfd. $100 par....	2,000	100.00	5.00%
4.40% pfd. $100 par	6,000	97.00	4.54%
Associated Telephone Co., Ltd.—5% pfd. $20 par....	75,000	21.00	4.76%
May			
United Telephone Co., Inc.—5% pfd. $100 par....	3,000	100.00	5.00%
Winter Park (Fla) Telephone—5% pfd. $100 par..	1,600	100.00	5.00%
June			
Interstate Telephone—$5.50 pfd. no par.....	9,238	100.00	5.50%
August			
Associated Telephone Co., Ltd.—5% pfd. $20 par..	75,000	21.25	4.70%
Common Stocks			
March			
Mountain States Tel & Tel—(5.00) common $100 par	191,881	100.00	5.00%
April			
Peninsular Telephone—$2.50 com, no par.....	35,374	37.50	6.66%
June			
General Telephone Corp.—$2 Com, $20 par.....	208,260	25.125	7.96%
Pacific Telephone & Telegraph—$6 common $100 par	601,262	100.00	6.00%
July			
Lincoln (Neb.) Tel & Tel—$1.50 com., $16.66 par..	15,000	20.00	7.50%

Winterizing The Outside Plant

By B. C. Burden

Telephone Engineer, Lincoln, Neb.

General

IT IS STILL too early to be thinking about getting out the storm windows or starting the furnace but it is about the right time to start "*winterizing*" the outside plant for the cold days ahead. The cool crisp days of fall are ideal for outside construction activity. Plant work which can be completed by mid-December can usually be handled with maximum labor efficiency in most states during the months just ahead.

This article is intended to review standard repair and construction practices for the benefit of the smaller companies with plants which may need a substantial amount of work to put them in condition for the winter just ahead.

Field Inspection

The initial step in "winterizing" the outside plant against the ravages of snow and ice is for the Plant Manager to check the present condition of the outside plant. The need for getting immediate data on the amount of work which should be done before fall makes a careful "pole-by-pole" inspection impractical. However, it should be feasible, to make a quick "horseback" check of the overall plant to detect weak spots which should be repaired before winter. The horseback inspection can best be made by two people, one driving while the other observes and records line conditions. The inspector should be equipped with forms and maps on which to record the amount and location of needed repairs. For this type of inspection, some inspectors prefer to ride in the back of an open type truck or car so as to be in better position to observe the condition of wire, drops, poles, etc.

The inspector should be on the lookout for any of the following bad conditions: (*See Fig.* 1)

(1) Poles which require replacement because of being rotted off, split by lightning, etc.

(2) Exceptionally rusty wire.

(3) Bad splices.

(4) Inadequate tree clearance (particularly dead limbs that might fall into the lead when loaded with sleet).

(5) Poor construction at junction poles such as loose jumpers i.e., not soldered or no test connectors.

(6) Loose or rotted arms and pins.

(7) Loose and missing guys.

(8) Inadequate wire clearance over highways, private drives, etc. or between power and telephone lines.

(9) Missing or broken insulators.

Determining Pole Condition

Obviously butt treated poles will probably be in good condition. Pike pole tests on a few poles in each mile will usually give a fair indication of the strength of the lead. Particular care should be taken in inspecting poles which carry heavy rural or toll circuits especially if the leads are in exposed locations where they would get the full effect of sleet and wind storms. The inspector

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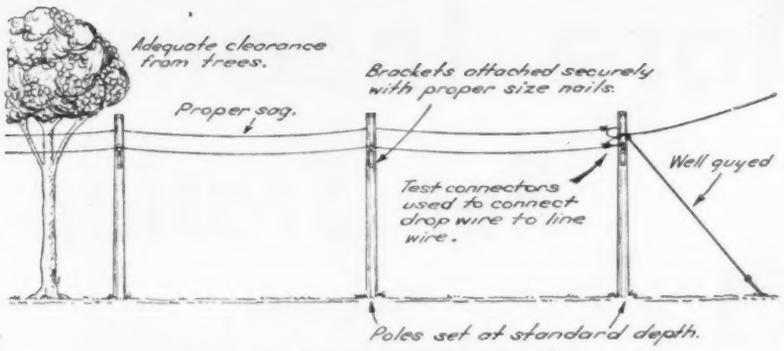

Adequate clearance from trees.
Brackets attached securely with proper size nails.
Proper sag.
Well guyed
Test connectors used to connect drop wire to line wire.
Poles set at standard depth.
Fig. 1—Elements of Good Rural Line Plant.

should be given some idea of the amount of work the company is in position to do so as to be better able to make recommendations as to the amount and kind of repair work which should be set up in the construction program.

It is usually helpful to classify the inspection items according to the urgency of the work needed. These classifications could be: Class No. 1—Urgent, Class No. 2—As soon as possible, Class No. 3—Deferrable for one year if necessary, and Class No. 4—Work which should be done as a major project at some future time. This classification will make the inspection report more useful when setting up the "winterizing" program.

The inspection forms should be numbered and should be "keyed" directly to city and rural maps.

Planning the Work

With the inspection completed the next step is to carefully analyze the data and plan the work. If as is usually the case, money and manpower considerations limit the amount of work which can be done. The information collected will need to be analyzed on the basis of how much work falls into Class 1 or 2 and the cost of doing this work. If it appears that additional work could be handled then work in Class 3 and 4 categories could be considered.

Consideration should be given to the order in which the various work projects will be undertaken. An orderly method of setting up the work is to prepare and follow what might be termed a *work schedule sheet* which list in chronological order the type and locations at which work is to be done, and the manpower requirements.

The total material requirements should be determined as promptly as possible and orders placed for material not already in stock. The supplier should be told the approximate time the materials ordered will be needed. Extra tools that might be required to expedite the work should be ordered at the same time as the material.

Engineering Considerations Govern Work Planning

In laying out the construction work consideration should be given to such basic engineering questions as:

(1) Should existing heavy open wire leads which require extensive work be replaced by cable?

(2) In the case of cable replacements what size cable should be chosen to meet existing and future line requirements?

(3) If substantial replacements or repairs are involved should lead be moved to a new route having more desirable characteristics than the present route?

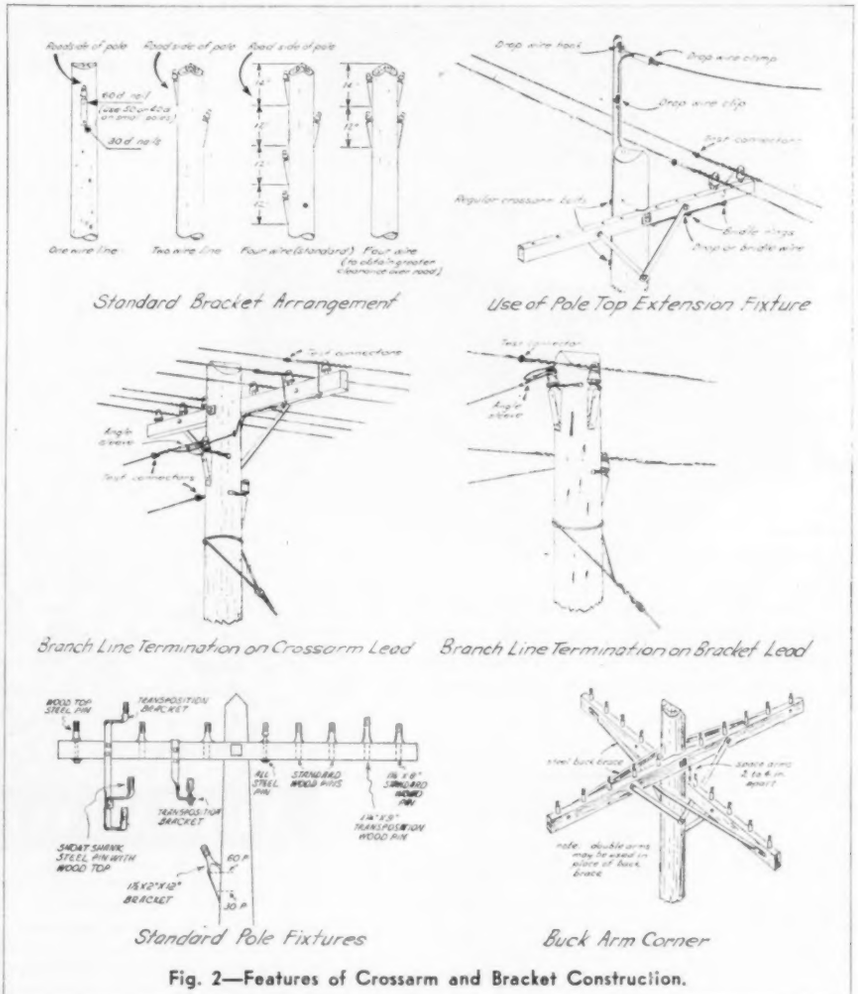
(4) If an open wire entrance lead is to be replaced with cable what gauge cable should be chosen for proper transmission?

(5) If a substantial number of poles are to be replaced what pole height should be chosen taking into account future growth, the need for ground clearance, etc.?

(6) Is the present system of transpositions in the open wire lines adequate?

Good Pole Line Construction

Adoption of standard practices by the small company will help to insure maximum life and minimum


Standard Bracket Arrangement
Use of Pole Top Extension Fixture
Branch Line Termination on Crossarm Lead
Branch Line Termination on Bracket Lead
Standard Pole Fixtures
Buck Arm Corner
Fig. 2—Features of Crossarm and Bracket Construction.

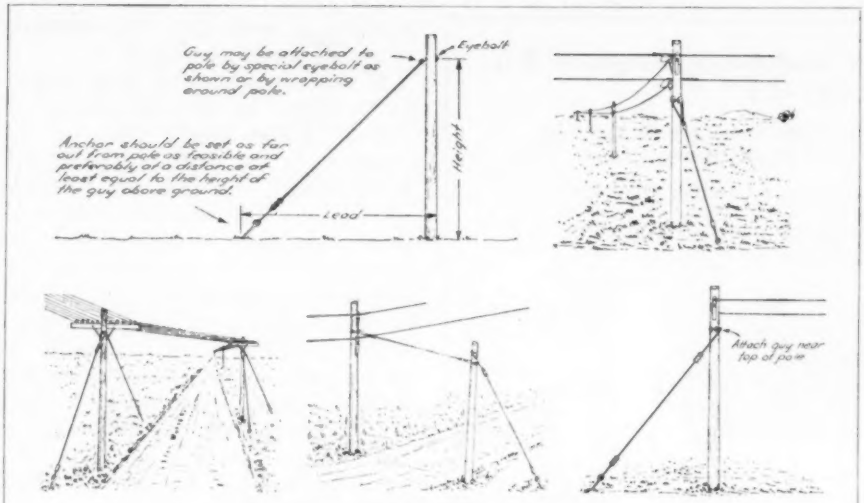

Guy may be attached to pole by special eyebolt as shown or by wrapping around pole.
Eyebolt
Anchor should be set as far out from pole as feasible and preferably at a distance at least equal to the height of the guy above ground.
Height
Lead
Attach guy near top of pole

Fig. 3—Typical Guying Arrangements.

maintenance difficulties in its telephone plant. In the paragraphs which follow the writer suggests good standard construction practices suitable for small Independent plants. Most of these practices are the same as those used by the larger companies and represent best present day practice. In some situations there may be good reasons for departing from the standards suggested because of local conditions or the materials available, however they represent a good guide to follow.

The beginning of good outside plant construction is at the bottom of the hole. In other words holes should be of adequate depth to properly support the pole considering its height and load carried. *Table No.* 1 gives standard setting depths (also labor units) for poles set in normal soils. The labor units shown are not accurate for all sections of the country and merely represent typical experience in average soil.

Table No. 1—
Hole Depths and Average Labor Units Per Pole

Pole Length	Average Labor Hours	Setting Depth
16	1.45	3
20	2.00	3-4
25	3.00	4-5
30	3.85	5½
35	4.75	6
40	5.40	6
45	6.40	6
50	7.70	7

The smaller companies with a substantial amount of hole digging to be done may find motorized hole digging equipment a necessity. The electric motor operated earth auger offers a very satisfactory method of producing holes with minimum investment in digging equipment.

The erection of the small poles used in two and four-wire rural lines by a two or three man gang presents no problem. But larger poles, such as those used on heavy leads, at railroad crossings, and elsewhere will require special equipment. If a standard boom and winch equipped truck is not available, a low cost hand operated winch plus an improvised pipe boom on a light open bed truck offers a simple satisfactory arrangement.

Poles should be carefully lined up as both the strength of the line and its appearance depends somewhat on the poles being set in a straight line. "Lining up" can be accomplished by the simple process of sighting across three range rods, two of which are in line with the lead. In making pole replacements or building new lines the need for adequate clearance over points where the lead passes over highways, driveways, or railroad tracks should not be overlooked. The use of poles of graduated heights on the approaches to a railroad or highway crossing is desirable both from the standpoint of appearance and to minimize strain on the ties and pins.

Pole Fixtures

Crossarms, brackets, and other pole fixtures like other features of outside plant construction should always be placed according to standard practice and with standard materials. The principal features of standard arm and bracket construction is shown in Fig 2. The placing of brackets on a "hit and miss" basis is a good illustration of how non-standard construction causes unnecessary trouble. Many cases of crosses and shorts are often caused by non-standard bracket construction. Another example of the trouble that results from non-standard construction is the use of the wrong size nails for attaching brackets. This results in the brackets pulling loose if the nails are too small, or

Table No. 2—Data on Guy Wire

Steel Guy Strand

Diameter in Inches	Strength in Pounds Ordinary	Siemens-Martin	High Tension Steel
¼	1,900	2,380	3,960
5/16	3,270	5,359	6,820
⅜	4,250	6,950	10,800
7/16	5,700	9,350	14,500
½	7,400	12,100	18,800
⅝	11,600	19,100	29,600

Steel Guy Wire

Size (Steel Wire Gauge)	Strength in Pounds Ordinary	Siemens-Martin	High Tension Steel
No. 4-BWG	2,400	3,000	5,000
No. 6-BWG	1,740	2,170	3,620
No. 8-BWG	1,240	1,560	2,570

Recommended Sizes

Number of Wires	Size Strand or Wire
2-4	No. 6 solid steel
5-20	1-6,000 lb. guy
21-30	1-10,000 lb. guy
31-40	2-10,000 lb. guy

Table No. 3—Stringing Sags for Amertel-85 Telephone Wire (No. 12 B. W. G.)

Heavy Loading Districts—Span Lengths from 100 to 150 Feet In Same Spans with Galvanized BB and Hard Drawn Copper Wires

(May also be used in Medium and Light Loading Districts)

TEMPERATURES IN DEGREES FAHRENHEIT

Span Length (Feet)	100°	90°	80°	70°	60°	50°	40°	30°	20°	10°	0°	-10°
	—SAGS IN INCHES—											
100	9.5	8.5	7.5	6.5	6.0	5.5	5.0	4.0	4.0	3.5	3.5	3.0
110	11.5	10.0	9.0	8.0	7.0	6.5	6.0	5.0	5.0	4.5	4.0	3.5
120	13.5	12.0	10.5	9.5	8.5	7.5	7.0	6.0	5.5	5.0	4.5	4.5
130	16.0	14.0	12.5	11.5	10.0	9.0	8.5	7.0	6.5	6.0	5.5	5.0
140	18.5	16.5	14.5	13.0	11.5	10.5	9.5	8.5	7.5	7.0	6.5	6.0
150	21.5	19.0	17.0	15.0	13.0	12.0	11.0	10.0	9.0	8.0	7.5	7.0

(This table Copyright 1939, 1940, 1945 by Indiana Steel and Wire Co.)

the pole splitting when they are too large.

Adequate Guys and Anchors

A pole line with inadequate guying is like a house with a poor foundation. Line wire tension can not be maintained causing abnormal sags and excessive maintenance costs, poles tend to pull over or out of line, and many other bad effects result from inadequate guying practices. The practice of using several strands of ordinary telephone line wire in lieu of standard guy wire is false economy. Even in these days of high steel prices guy wire is relatively cheap when the quantities required in the average plant is considered. Typical guying arrangements are shown in *Fig.* 3.

It is satisfactory to use solid galvanized iron wire for guying 2 and 4-wire rural leads. For this purpose No. 6-BWG wire is recommended. *Table No.* 2 gives the strength of the several types of guy wire and recommended sizes.

It is not within the province of this article to discuss the relative merits of the several types of anchors. In general, the ratings given anchors by the manufacturers are reliable and the Plant Manager should select an anchor which would seem to work well in the soil involved. The screw type anchor has the particular merit of being easy to install in most soils. Expanding type anchors are popular as is also the plate anchor. The important factor is to use an anchor of proper size for the load involved. Don't expect to hold a three-arm lead with a four-inch anchor.

Regardless of how strong the anchor is it won't be able to hold its load if the guy wire is not properly placed. Always attach the guy as near the load center as possible. The *thimble-eye bolt method* of attaching guy wires is now pretty well standardized and has some advantages over the early "wrap" type guy attachment.

A common fault in small plants is the tendency to put the guy wire too far down on the pole. Get the guy as high as possible. On one-arm leads place the guy between the crossarm and the crossarm braces.

Features of Open-Wire Construction

The essential elements of good open wire construction are: (1) Standard fixtures and ties should be used; (2) wire should be so placed as to avoid mechanical damage, and (3) proper sag should be provided.

Sag data for normal length spans in the heavy loading districts in States subject to winter sleet and snow is given in *Table No.* 3. A sag gauge, which can easily be constructed from light sheet metal, should be used for sag measurements as shown in *Fig.* 4.

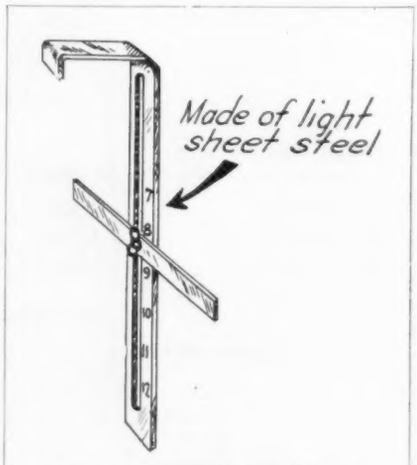


Fig. 4—Homemade Sag Gauge.

If sag adjustment is done largely by "instinct" be sure the wire is not pulled "fiddle bow" tight in hot weather, or the first cold snap will usually result in a number of broken wires. Line wire ties should be only those that have withstood the test of time. This is especially true of long span construction and in connection with copper or Copperweld wire. Iron line wire is capable of taking considerable abuse when not properly tied, but even it will profit by securely placed standard ties. A good tie will not wear the line wire and will not pull off when a heavy ice or wind load is on the wire. The standard ties shown in *Fig.* 5 do not embrace the "armor type" ties which are recommended for long span high tensile strength steel wire. Companies planning on long span construction should get a copy of the wire data booklets available through wire suppliers and which show the ties and sags recommended for long spans of steel wire.

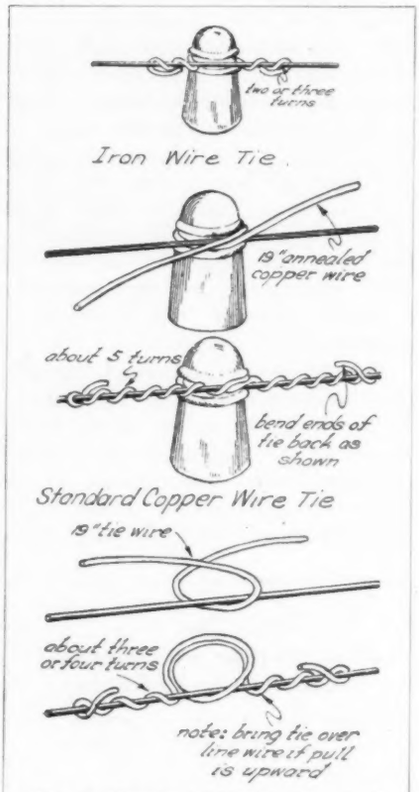

two or three turns
Iron Wire Tie
19" annealed copper wire
about 5 turns
bend ends of tie back as shown
Standard Copper Wire Tie
19" tie wire
about three or four turns
note: bring tie over line wire if pull is upward

Fig. 5—Standard Ties for Iron and Copper Wire.

Wire Dead-Ending Practices

Line wire should preferably be dead ended with either a half-sleeve or an offset compression sleeve. The

(*Please turn to page* 78)

Overhauling Outside Plant

BEFORE THE CUTOVER

BY JOHN S. REED

Conversion of open-wire plant to cable and utilizing joint construction in town, replacing bad drops and obsolete, run-down open-wire leads in rural areas are necessary to the conversion program.

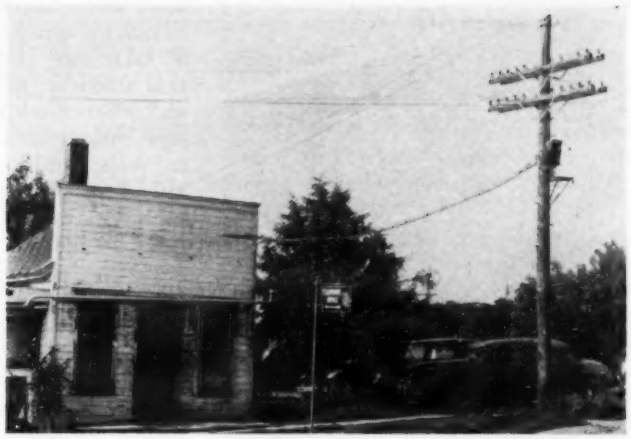


Fig. 1—Magneto central office with office pole carrying open wire circuits from town and rural stations and using aerial entrance cable.

Fig. 2—Newly constructed community automatic exchange building with underground entrance cable to aerial cable. The office pole also carries power and street lighting circuits.

ONE IMPORTANT step required to successfully implement an automatic conversion program is the repair or replacement of outside plant. Such a step must be undertaken and completed sometime before the cut over of the exchange to automatic operation.

The reason usually given for the plant rehabilitation is that the line leakage needs to be maintained at a figure that will enable the automatic switching equipment to perform efficiently. As a rule, magneto open-wire lines have very low insulation resistance. It is possible for such lines to have as low as 1000 ohms insulation resistance per mile and still work fairly well. This is not the case with automatic or manual common battery lines, which should not have less than 10,000 ohms insulation resistance per mile, if transmission is not to be adversely affected and if automatic equipment is to perform satisfactorily.

Low insulation is most commonly caused by contact of the line with trees and shrubs, missing insulators causing the line wire to touch a wet crossarm, worn insulation on drop wire, holes or cracks in the lead sheath of cable resulting in entrance of moisture.

Good line insulation, however, should not be considered the only important factor in the decision to rehabilitate outside plant. Wire lines, drops, and cable that have been rebuilt or adequately repaired and given sufficient clearance from trees and shrubs, obviously do not require so much maintenance as plant that has been allowed to run down.

Fig. 3—Cable terminal pole in joint construction. This pole also carries a street lighting fixture.

Another important consideration is that of good appearance of the plant. It should be remembered that the subscribers are going to pay a higher rate after their service is made automatic. Naturally they will expect some visible evidence that the extra charge is being utilized for their benefit. Conversion of open wire plant to cable and utilizing joint construction in town, replacing bad drops, and rerouting existing drops, replacing obsolete and rundown open wire leads in rural areas, and clearing away tangled growths may be regarded as comparable to the installing of modern automatic telephones and the erecting of a new building to house the automatic equipment.

This article is mainly concerned with a general plan for replacing open wire with cable in town, rehabilitating outside plant, and building extensions of present lines.

Before initiating the automatic conversion program, all prospective

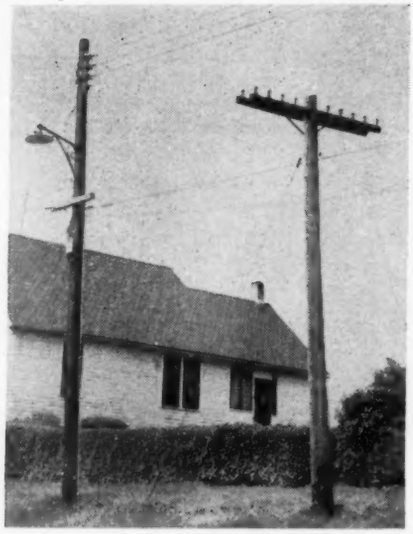


Fig. 4—Dead-end pole in cable lead replacing old open-wire dead end.

subscribers in the exchange area should be solicited for service. It has been found that, invariably, after automatic service is established in a community, many non-subscribers, particularly those in the rural sections, will apply for telephone service.

It has been proved that many non-subscribers are attracted by the prospect of having a thoroughly reliable 24-hour telephone service that is practically as good as that obtainable in large towns. Because of their past resistance to sales efforts, they are sometimes overlooked by telephone company representatives.

The writer knows of one case, a number of years ago, in which a certain telephone company converted a small community to automatic operation without prior solicitation of additional subscribers. After the conversion, most of the non-subscribers, when they learned that the town had automatic service, made application for this service. The net result was that over 100 new subscribers were added to the exchange and the company was obliged to place additional switching equipment and telephones to take care of the extra load. The real difficulty, however, was in the installation of additional circuits to the new subscribers. It was necessary to make additions to a plant that already had been modernized, entailing extra expense that could have been avoided in the first place.

In larger exchanges, the commercial department takes care of the necessary soliciting work. In the smaller communities, the manager is naturally the person who should make the contacts with non-subscribers. Before solicitation is started, advertisements concerning the proposed conversion should appear in the local papers, offering the new service to non-subscribers. It should be noted,

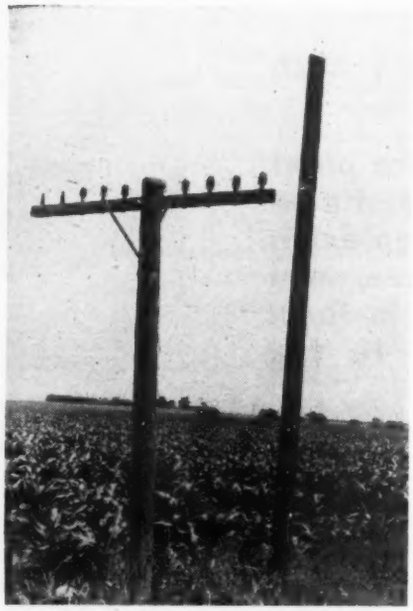


Fig. 5—Old, badly decayed pole to be replaced by taller pole.

though, that advertising alone is not wholly sufficient. Each individual prospect must be approached by a competent company representative, who can explain in detail the conversion program and satisfactorily answer questions regarding the service, the probable date of conversion, the new rates, and etc.

Replacement of Open Wire Town Lines With Cable

The replacement of open-wire lines with cable invariably results in a marked improvement in the appearance of the town plant, particularly when joint construction is utilized. Figures 1 to 4 illustrate this point.

It is usually not difficult to obtain an agreement with the local power company and the town lighting department for joint construction, especially when these groups are progressive and alert to improvements that will benefit the community as a whole.

Care should be taken to see that the different facilities involved in the joint construction have the proper clearances from each other. Minimum required clearance of telephone cable from the nearest wires of another facility is six feet. If a guardarm is provided, as indicated in Figure 3, this minimum clearance may be reduced to four feet. The minimum distance between an associated fixture of the power facility and one of the cable facility is 40 inches.

Lashed cable construction is greatly favored by telephone companies for improving the appearance of the plant and reducing maintenance costs.

When cable is to be placed, a preliminary survey is necessary to establish the number of lines, the routing of the cable, and the wire center (if the central office is to be placed at a new location). A house count will establish the number of lines to be placed. For party lines, a factor of 0.6 times the number of two-party line subscribers and 0.3 times the number of four-party line subscribers will give the number of party lines required. It is desirable to have a number of vacant pairs for future

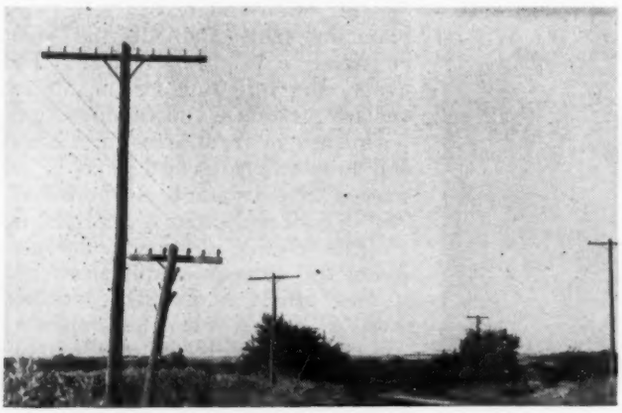


Fig. 6—Use of tall poles to clear heavy windbreak. The short-pole lead is in the process of being removed.

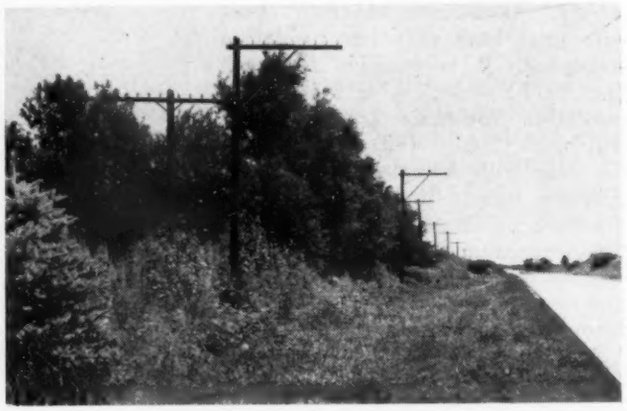


Fig. 7 (a)—Poles with extension arms pointing in the direction of road side of lead on main highway.

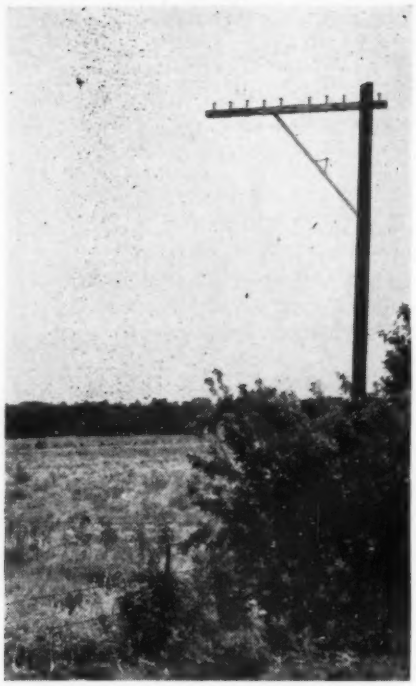


Fig. 7 (b)—Pole with extension arm pointing to field side of lead on main highway.

growth and to produce a flexible plant, as well as to allow for certain pairs going bad.

The gauge of the cable pairs depends on the permissible transmission loss. In small towns, 26-gauge cable will be found ideal. This size may be used in subscriber loops up to three miles long without serious transmission loss.

In the case of rural line feeds, the cable should be of larger gauge. As a general rule the conductors should be 19 gauge for a maximum length of two miles from the central office. Longer rural cable leads will require loading, if transmission losses are not be excessive.

Many companies have installed long rural cable leads with the hope of reducing line maintenance to a minimum, only to have subscribers complain of the unsatisfactory transmission. The logical procedure is to carry the rural cable only to the town limits and then use a well constructed open-wire feed to the farm spurs.

The size and number of terminals to provide has always been a debatable point. Although smaller capacity terminals are available, it is the writer's belief that a 15-pair terminal should be about the smallest that may be installed, primarily to assure flexibility in assigning pairs to subscribers. If smaller capacity terminals are used, very long drops may be frequently found necessary, in order to obtain connection to an assigned cable pair for a subscriber.

As to the number of terminals to provide, one or two terminals of the 15-pair size per block, depending on the number of subscribers in the block, will be found sufficient. In the business district, more outlets may be found necessary.

The multipling plan for cable pairs should always be followed. This plan provides several outlets for each cable pair and enables changes in pair assignments to be easily made in subscriber moves and number changes. This arrangement has the advantage of requiring a smaller number of cable pairs than if a straight termination plan were followed.

For good cable construction, it is desirable to use class 7 poles and to provide a maximum pole spacing of 150 feet. The messenger strand should be 6,000-pound for maximum size of 300 pr.-26 ga., 200 pr.-24 ga., or 150 pr.-22 ga. cable. For cables over these sizes, up to 600 pr.-4 ga. or 400 pr.-22 ga., 10,000-pound strand

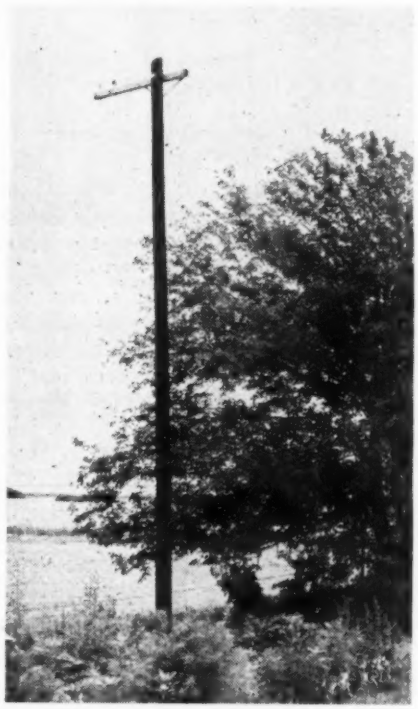


Fig. 7 (c)—Tall pole with 6-pin extension arm to clear young Sycamore.

is needed. The stringing tension of the messenger should be 1,000 pounds for the 6,000-pound size, or 1,500 pounds for the 10,000 pound size, at a temperature of 60 degrees.

In the case of an existing cable plant, it is usually necessary to recondition the plant. In a magneto exchange, cable that works perfectly well with magneto telephones will develop numerous cases of trouble when the central office battery and machine ringing current is applied to the cable pairs. This is due to the fact that the cable has many points of weak insulation that do not show up until a high voltage battery (48 volts) is applied.

The remedy is to check the condition of the cable sometime before the cut over by connecting the central office battery to the pairs and noting which ones cause trouble. Cable splicers are then sent out to clear the cases of trouble. Even then, some trouble may occur within several days after the cut over, as the result of other weak spots breaking down under the steady application of central office battery voltage.

To place existing cable in first class condition for carrying central office battery, cable splicers should be assigned to go over the entire system systematically, replacing defective sections with new cable. Complete replacement, of course, is not necessary, since it is possible to repair even crystallized cable by the simple expedient of flowing solder over damaged places in the sheath with a blow torch or a prestolite torch, where these sections are not over ten feet long. All ring cuts and minor cuts or breaks can be treated in the same way, if the cable is free from moisture that might be sealed in by this process.

Ring-supported cable may be converted to the lashed type by the same cable splicers, after all necessary repairs and replacements have been made. Two men can lash a surprisingly large amount of cable each day after they have become accustomed to this work.

Determining Extent of Repairs or Replacement of Open-Wire Plant

A survey of the rural open-wire plant should be conducted to determine the extent of work necessary to bring the plant into good condition. This inspection determines the condition of the poles, crossarms, line hardware, line wires, and tie wires. In addition, other unfavorable conditions, such as inadequate clearances from the ground or from foreign

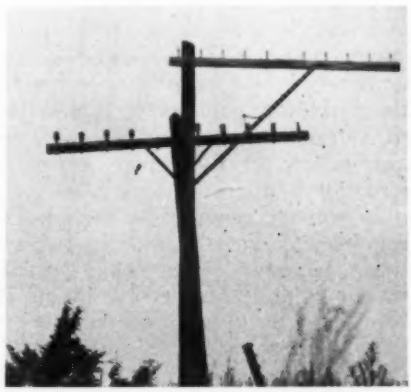


Fig. 7 (d)—Pole with ten-pin extension arm to replace shorter pole with standard arm construction.

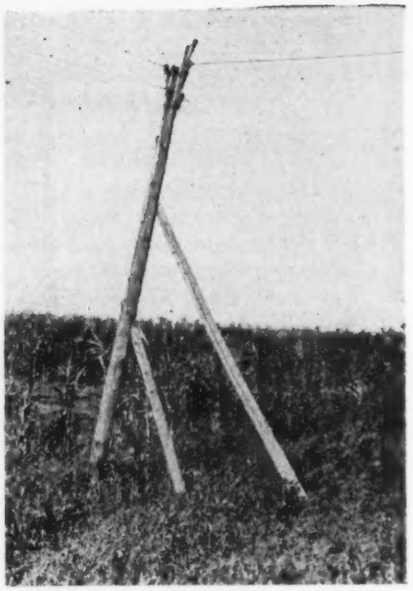


Fig. 8—(Above) Pole raked to clear Chinese Elm in farmyard.
Fig. 9—(Left) Pole offset on private property to clear large Cottonwood.
Fig. 10—(Right) Both pole and guy needs complete replacement.

wires and tree growths, are noted down for correction.

In conjunction with the survey, a study should be made to determine the probable wire load for the rural area. This is done as follows:

(1) Locate all rural subscribers and prospects for telephone service on a rural plant record map.

(2) Arrange the subscribers and prospects by groups, each group containing eight families to be served by one line. (Eight stations on one line is a desirable maximum to provide the best possible service for this class of subscribers.) This grouping should be done in such a way as to keep the lengths of main lines and spans from these lines to a minimum for economical construction.

(3) From the number of lines, thus obtained, determine the material requirements for adding the required number of circuits for the subscribers and prospects. The required items may be ascertained by consulting a table of pole and fixture requirements. Table 1 on Poles and Pole Fixtures —Pole Spacings is suitable for heavy and medium loading districts.

From the notes taken on the plant survey and the requirements for extensions of the present lines and additions of more circuits, it is possible to determine the total material requirements for the repair and construction of the open-wire plant.

It is not necessary to completely rebuild any but the most run-down lines. If any construction is observed that is obsolete, but in sound condition, it is not necessary to replace the obsolete type of construction with more modern type, provided it will cause no trouble in the future. An example of an obsolete construction would be a pole bracket with knob for attaching a drop on a good pole. If a drop wire is used, it is only necessary to remove the tie, slip a drop wire clamp over the knob, and then attach the drop in the clamp.

Suggested Construction Practices For Open-Wire Lines

The rebuilding of open-wire plant includes the repair and replacement of all worn out or inadequate items of plant equipment, the extending of present open-wire circuits, and the adding of more circuits to existing lines to take care of new subscribers.

The first step is the replacement of decayed, weak, or short poles (Figure 5). At the same time existing and new poles should be located to clear trees and shrubs and thus reduce future trimming work to a minimum where practicable. The methods employed are, namely, using taller poles, raking the poles, placing extension arms on the poles, and relocating the poles to the field side of the lead. Figures 6 to 9 illustrate these methods.

A pole need not be replaced on account of a weakened butt, if the rest of the pole is absolutely sound and the attachments are in good condition, so that it would be uneconomical to replace the entire pole. In such cases a good 10-foot creosoted stub should be used to reinforce the pole. Stubbing bands are best for this purpose.

The guys and anchors at corner, dead-end, and branch-off poles should

Table 1.—Poles and Pole Fixtures—Pole Spacings.

No. of Wires	Avg. No. Poles per Mile	Span Length in Feet (1) Normal	Min.	Max.	Min. Pole Size Length (2) Class		No. of Pole Fixtures Crossarms 8′ 6″ Brackets 6-pin	10-pin
Standard Construction—East and West Lines								
2	25	210	168	231	16	9	2	- -
4 to 6	25	210	168	231	16	9	-	1 -
8 to 10	25	210	168	231	16	8	-	- 1
12	25	210	168	231	20	8	2	- 1
14 to 20	36	146	117	160	20	8	-	- 2
22	36	146	117	160	20	6	2	- 2
24 to 30	40	132	106	145	20	5	-	- 3
Standard Construction—North and South Lines								
2	25	210	168	231	16	9	2	- -
4 to 6	25	210	168	231	16	9	-	1 -
8 to 10	25	210	168	231	16	8	-	- 1
12	25	210	168	231	20	8	2	- 1
14 to 20	30	176	141	194	20	8	-	- 2
22	30	176	141	194	20	6	2	- 2
24 to 30	36	146	117	160	20	5	-	- 3
Long Span Construction								
2	16	330	264	363	20	9	2	- -

be examined. An extreme case, such as that pictured in Figure 10, requires replacement of the pole and the installation of a 2,200-pound strand guy and 4" anchor. Examples of good guying practice at poles corner and spur branchoffs are shown in Figures 11 and 12.

An excessive number of brackets (Figures 13 and 14) is not desirable. When more than two brackets are involved, a much neater construction is obtained by placing crossarms instead of the brackets, and it is possible to obtain more clearance from the ground, where necessary, as in the case of farm driveways. It is satisfactory to use two brackets with one or two crossarms, if it is evident no additional circuits will be needed for a long time.

Rusty line wire requires immediate replacement. Handmade splices should be cut out, wherever found. It is not desirable to have too many splices, as indicated in Figure 14. The general rule in such cases is to replace the line wire, if the length between splices is 25 feet or less. Compression, or rolled, sleeves should be used in all cases for making absolutely reliable splices.

Transpositions of the circuits should never be overlooked, particularly when power parallels are involved. Although it is possible to reduce noise and crosstalk by keeping the wires free from tree grounds, avoiding defective splices and maintaining adequate clearances from the power parallel, proper transposition of the wires will still further reduce the induction. When the power company cooperates by providing transpositions of their wires at the proper points, even better results are obtained.

Fig. 12—Right-angle corner in well constructed bracket lead.

Rehabilitating Drop Wire Plant

Drop wire, particularly the older type braid and rubber covered, is the most perishable of all material used in outside plant. It is necessary to give drop wire all protection possible. This is done by properly routing the drops to avoid trees and obstruction, covering the wire with loom or flexible plastic tree guards, trimming trees, when permission can be secured from the property owner, and replacing obsolete wire ties with drop wire clamps.

In cable plant, rerouting of drop wire is most easily accomplished by placing a span clamp on the cable messenger, in such a location that the drop will clear trees in its path from the messenger to the subscriber's residence. In other cases, placing the drop somewhat higher or lower on the cable terminal pole (with due regard for proper clearances from the ground or from foreign circuits) sometimes will provide the necessary clearances from obstructions.

If obstructions cannot be avoided, loom or flexible plastic tree guard must be used. The latter, though rather expensive, has the advantage of not requiring the removal or cutting of the drop to slip the protective covering over it. The plastic tree guard can be placed in the drop wire at a convenient point and then slid along the wire to the desired place. It is held in place with an "S" clip clamped in position on the wire on each end of the guard by means of an attachment on a tree trimmer, which is operated by the same rope that closes the cutting blade.

Drop wire ties have long since passed out of the picture, as far as most telephone companies are concerned. When used to fasten a span to a supporting knob, they often cause

(*Pease turn to page* 70)

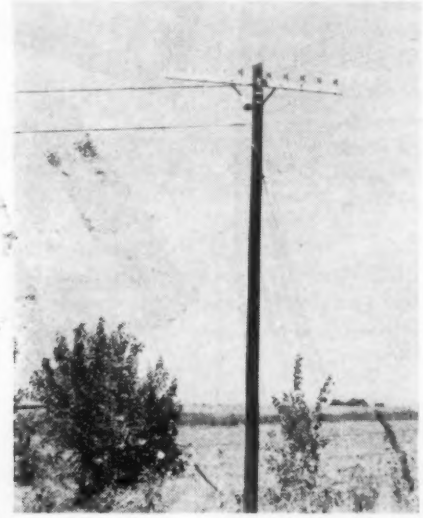


Fig. 11—(Above) Branch-off pole for spur line to farm house.
Fig. 13—(Left) Part of two-pole corner in new crossarm lead.
Fig. 14—(Right) This badly decayed push-braced pole should be replaced.

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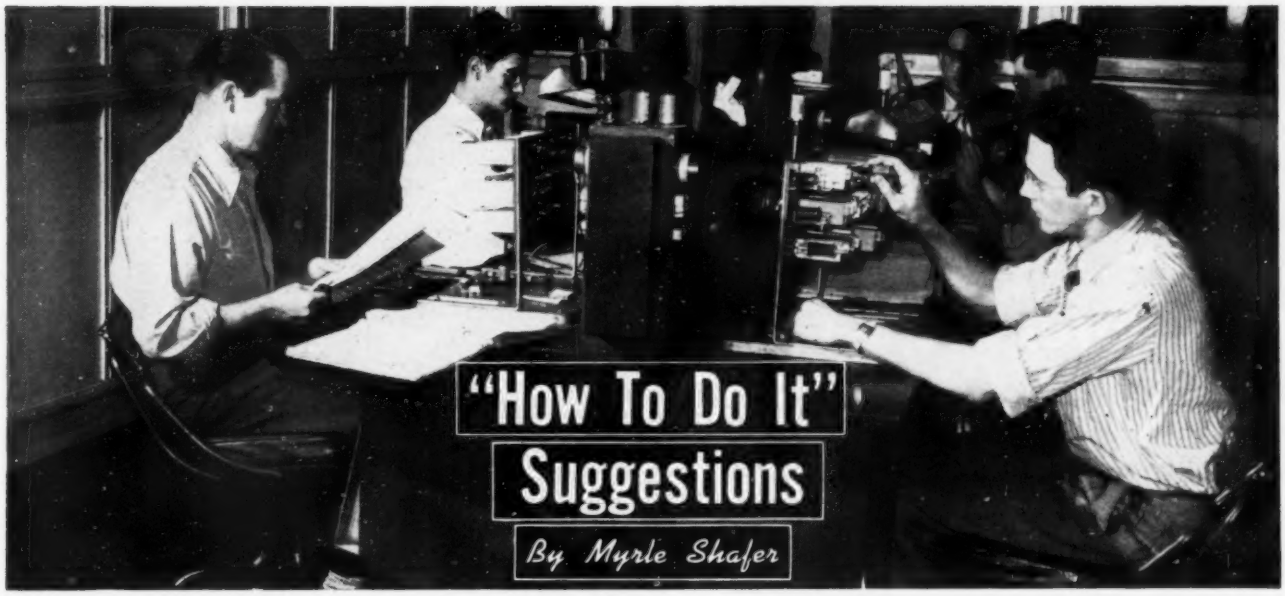

"How To Do It" Suggestions

By Myrle Shafer

Right and Wrong Methods Of Ground Wire Protection

WHERE the ground wire is taken down the outside of buildings it is often necessary to protect it from mechanical injury by passing vehicles. Figure 1 shows a right and wrong way to guard the wire. In the wrong way an insulated wire is taken through a section of iron pipe and then to the ground contact. Such an arrangement makes a very good choke coil to lightning and may cause the discharge

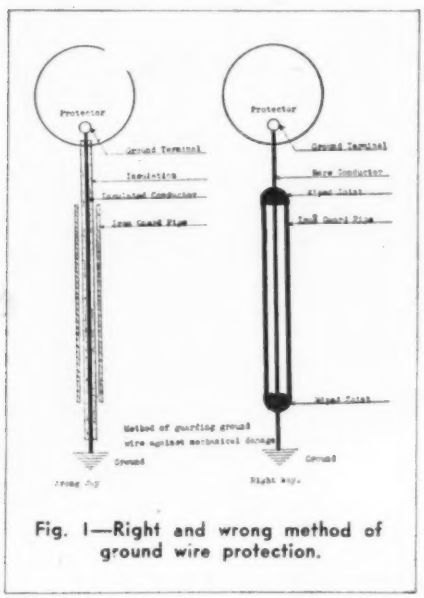

Fig. 1—Right and wrong method of ground wire protection.

to jump to some other object above the top of the pipe. The open end of the pipe also tends to collect enough dirt to plug the pipe part way down thus allowing water collect. The correct procedure is to run a bare copper wire through the pipe and have a cable man wipe a joint at either end. Thus the bare copper and the iron becomes parts of a common conductor and present a minimum of impedance to the oscillating discharge.

Fundamentals of Pole Line Guying

A GOOD guy is more than merely a wire from the top of the pole to any old anchor that happens to be handy. Since we have often examined the affects of inadequate guying such as poles out of line, slack wire, and even wrecked leads we decided to once again list the fundamentals of good guying:

(1) Always have adequate lead-height ratio. The stress developed in an anchor with an L-H ratio of 0.25 and with a 1000 pound pull at the top of the pole is 4,132 pounds. If this same anchor is moved further away from the base of the pole so as to give a lead-height ratio of 1.0, the stress on the anchor is only 1,114 pounds. Every effort should be made to get an L-H ratio of 1.0 or better.

(2) Anchors should be adequately large in holding capacity for the load which they carry. A four-inch anchor may slip or pull out when used on an 8-inch anchor load. Poles out of line and slack wire, and in some cases a wrecked lead, are the penalties for using a pee-wee size anchor for holding a king-size load. When in doubt use the larger anchor. The holding power of anchors is shown in Table One.

Snow Melting System Does The Job

HEAVY snowstorms last winter had no effect on sidewalks and truck ramps at the Covington, Kentucky, Southern District garage of the Citizens Telephone Co., Inc.

When the structure was built in 1947, a network of heating pipes designed by company engineers was embedded in the pavement at the entrance of the building. Hot water, forced through the inlaid pipe by a pump, raised the temperature of the sidewalk and ramps so that snow melted as it fell.

Installing the snow-melting system was as simple as putting in the radiant heating. Wrought iron pipe, the same kind used for service water lines, drains and downspouts in the building, was fabricated by bending and welding into serpentine coils. This pipe was used because it resists corrosion. The coils were positioned on the foundation fills underlying the concrete floor inside and the pavement outside. For comfort heating, the coils were spaced closer together to effect greater heat output. The sidewalk only has to be hot enough to melt snow but the floor temperature is maintained at about 80 degrees to

(*Please turn to page* 50)

Table No. 1—*Holding Power of Typical Anchors*

Anchor Size	Holding Power in Pounds			
	Swamp	Sand	Clay	Hardpan
4"	800	1,000	2,000	3,000
6"	1,500	2,500	3,500	4,000
8"	4,000	6,000	7,500	8,000
10"	8,000	10,000	11,500	12,000

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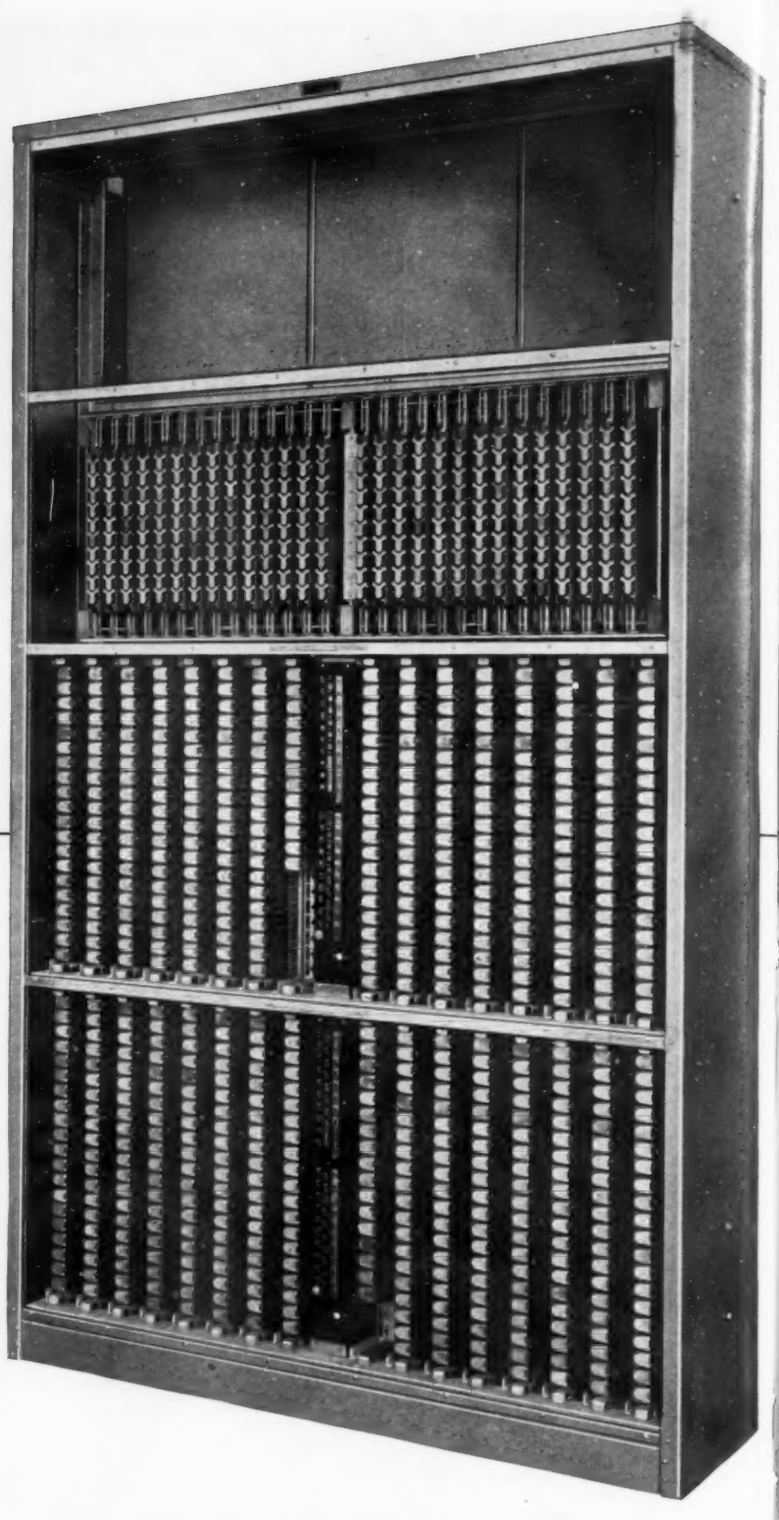

You've no problems or worries about future growth when you have a Leich Dial Switchboard.

The opposite page shows how you can add 10 lines in 10 minutes or less. There's no soldering, no wiring, no installation expense other than the price of the 10 line relay bar which is necessary to add 10 lines.

Even links can be added to your Leich Dial Switchboard in a matter of an hour or two — by your own switchboard man — with no soldering, wiring or possibility of error.

Combine this flexibility with the dependable operation made possible by this simplified type of relay operation, and you have every reason to want to investigate the Leich Dial System very carefully before deciding which dial switchboard is best for your exchange.

If you would like to receive the 20 page catalog which completely describes the Leich Dial Switchboard, just write Leich Sales Corporation, 427 W. Randolph St., Chicago 6, Illinois.

Total Time **10 MINUTES**

You can't do this wrong if you try. It's almost as simple as turning on the electric light. And, with this economical, sensible preparedness for future developments, the Leich Dial System gives you the reliable, trouble-free service for which relay switching is so well known. Why not write for catalog which gives complete details. Address Leich Sales Corporation, 427 W. Randolph St., Chicago 6, Illinois.

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1

Single, jack-in relay bars contain the line and cut-off relays for each group of 10 lines. These come from the factory in a single carton — wired, tested, ready to be installed. They are carried in stock for immediate shipment.

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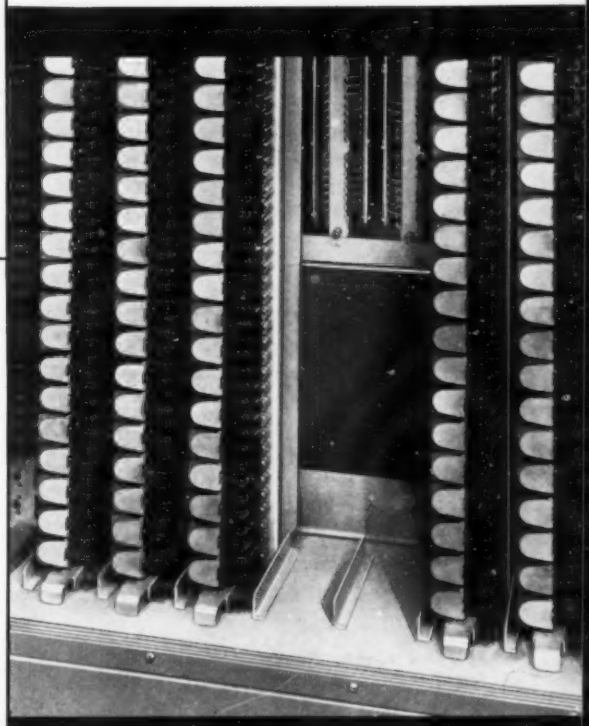
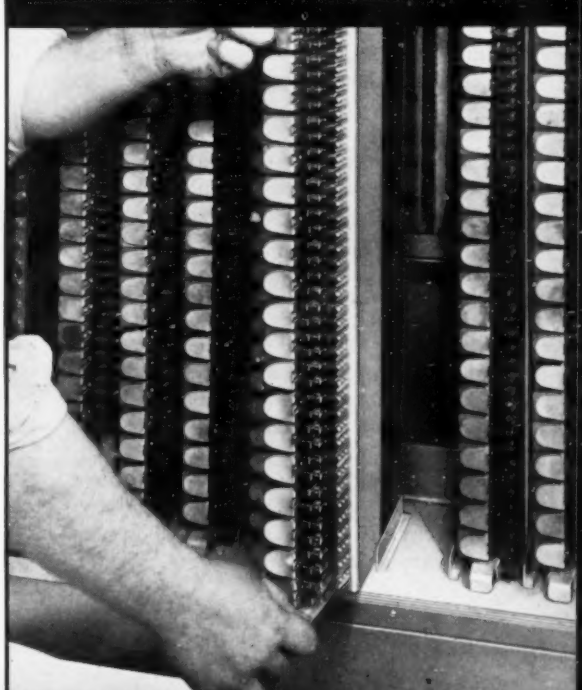


This shows the section of the Leich Dial System where the line relay bars are jacked-in. Every switchboard is fully wired and contains the jacks for plugging-in these 10-line relay bars up to the full capacity of the board.

3



All that's necessary is to jack-in the relay bar units as shown here. Each relay bar jacked-in adds 10 lines to the switchboard.

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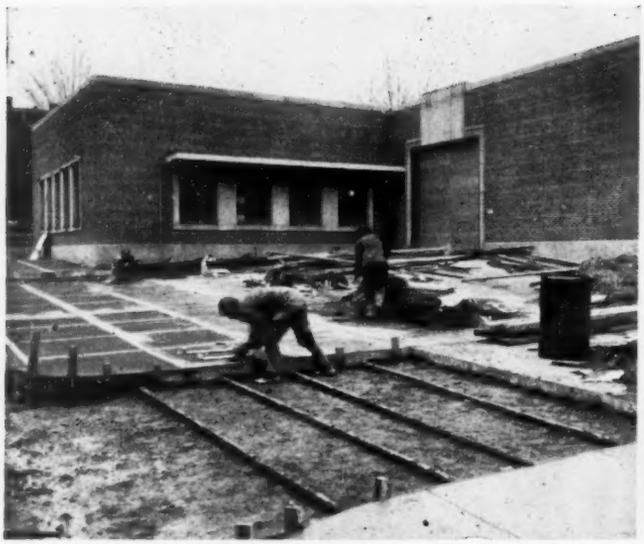


Wrought iron snow melting pipes being installed. The pipes are the same kind used inside the office section for the floor radiant heating system.

Without shovels or chemicals the sidewalks and truck ramps at Citizens' Telephone Co.'s Covington, Ky., district garage were kept free from snow and ice last winter.

achieve comfort. With the sidewalks and truck ramps protected by a snow melting system it was unnecessary for employees to take time off from other duties to shovel snow or scatter salt. Residual water from the melting of Only four pipes are needed in the wide sidewalk and each truck ramp to handle the melting operation.

It was found that snow or ice shaken off vehicles to be taken into the garage through either of the two entrances, soon melted from the heated driveways.

Company officials believe theirs is the first district garage to have snow-melting sidewalks and truck ramps, although several other buildings owned by telephone companies are equipped with radiant heating systems.

Spiral-4 Cable Useful For Temporary Connections

IN POLE line repair or rebuilding, it is often necessary to temporarily disconnect the telephone circuits during wire sags in crossarm leads that The practice ordinarily has been to No. 14 H.C. drop wire to keep working lines in use.

One company has been making extensive use or army surplus Spiral-4 cable for such temporary circuits. Their method is to splice one end of the cable to the wires at the start of the section being rebuilt, using the four conductors for two lines, and then lay the cable on the ground to the last pole of this section where the conductors are spliced to the corresponding line wires to bridge the section.

This kind of cable has been found particularly suited for temporary carrier circuits, being originally designed for army telephone carrier service. The cable can be utilized for bridging purposes when carrier transpositions are rearranged.

Using Dead-End Brackets on Crossarms

THE PROPER dead ending of open wire lines has always been a problem to plant men. Although sufficient bracing is obtained by the use of a double arm, there remains the problem of the strain on insulator pins resulting from the turning force exerted by the wire load without a compensating pull in the opposite direction. A few companies make use of extra insulators and pins on the second arm of the double arm, thus providing two insulators for each wire and reducing the strain on the pins.

A new idea that seems to be gaining in widespread use, particularly in the Bell organizations, is the use of dead end brackets on crossarms when dead ending line wires. A typical construction of this kind is illustrated in Figure 3. For one-crossarm leads, a six-pin crossarm may be used instead of the regular ten-pin arm and the dead end brackets spaced six inches apart with 18-inch spacing between the pole pairs. This construction enables the maintenance man to easily reach the farthest connection of the line wires to the insulators. The brackets are fastened to the crossarm by means of ⅜" x 4" carriage bolts. The lines wires are attached to the spool insulators by offset compression sleeves or rolled sleeves, that latter equipped with special dead end wire made to fit into the rolled type sleeve.

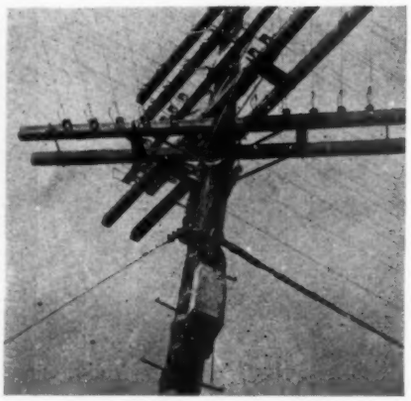


Fig. 3—Showing typical dead-end construction using double arm and dead-end brackets with spool insulators.

Power Line Exposures Can Be Dangerous!

WHEN TELEPHONE lines are involved in a power line parallel or crossings as they usually are, workers must exercise care in handling telephone wires and equipment, particularly after severe storms.

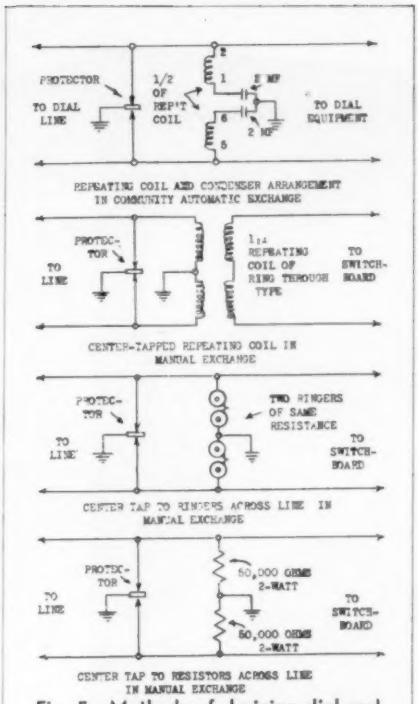
The hazard in cases of exposure to power lines result from the possibility of contact between power and telephone wires. Such contact ordinarily manifests itself as arcing accompanied by a hissing sound at protected terminals, at the protectors on the main frame in the central office, and at the subscriber's station protector. In certain situations, however, there may be no visible or audible indication of the presence of a high voltage at these points and the employee may receive severe shock and burns if he touches the protector equipment.

A safe rule to follow is to avoid contacts with telephone lines and equipment during and following a severe storm. Any indication of sparking or electrical arc on the lines or equipment must be taken as a warning that these lines may be crossed with

power circuits. The power company should be notified of this condition and asked to disconnect their affected power wires. The telephone lines and equipment cannot be considered safe to handle until positive assurance has been received that the power has been cut off.

Telephone circuits involved in long parallels with power lines may have considerable voltage induced across the m. Such voltages usually are not dangerous but may cause "surprise shock" which might result in a man losing his hold and falling from the pole.

To avoid the danger of surprise shock, the worker should be careful not to put himself in series with the ground and the line wires or between the line wires. Uninsulated guys on the pole or cable sheath or terminal case on junction pole should not be touched if one is in contact with telephone wires or terminals. A wise precaution is to make sure that one is in a safe, secure position of the pole (safety belt in use) before touching any metal parts.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1/2 OF REP'T COIL
TO DIAL EQUIPMENT
REPEATING COIL AND CONDENSER ARRANGEMENT IN COMMUNITY AUTOMATIC EXCHANGE
PROTEC-TOR
TO LINE
REPEATING COIL OF RING THROUGH TYPE
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CENTER-TAPPED REPEATING COIL IN MANUAL EXCHANGE
TWO RINGERS OF SAME RESISTANCE
CENTER TAP TO RINGERS ACROSS LINE IN MANUAL EXCHANGE
50,000 OHMS 2-WATT
CENTER TAP TO RESISTORS ACROSS LINE IN MANUAL EXCHANGE

Fig. 5—Methods of draining dial and magneto lines to reduce noise induction.

Measuring Wire Sag

OLD TIMERS in construction crews use a method of measuring wire sags in crossar mleads that eliminates the need for using a sighting gauge when the pole spacing is quite short. This method is illustrated in Figure 4. Sighting along the top of the crossarms may be employed when the span length is 100 feet at 30° F (in heavy loading district). Sighting along the bottom of the crossarms may be utilized when the span lengths are 100 ft. at 80°, 110 ft. at 70°, 120 ft. at 50°, 130 ft. at 30°, and 140 ft. at 20°. This method would be more useful in light loading areas, where the sags are smaller over a larger range of span lengths and air temperature.

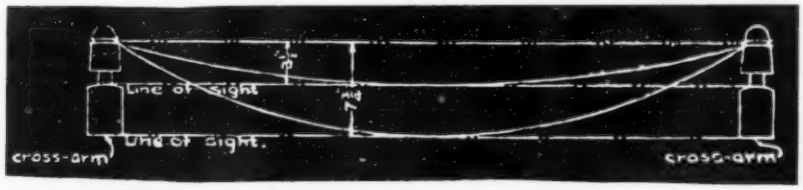


Fig. 4—Measuring wire sag by sighting along top or bottom of crossarms.

Methods of Reducing Noise On Open Wire Lines

NOISE induction on open-wire telephone lines paralleled by power lines always have been a more or less serious problem. The usual remedies are transposing the affected lines according to a transposition scheme, removing all possible grounds, such as branches and foliage in the wires, wires resting on a wet crossarm or touching a creosote treated pole or a guy, and insuring good series balance by replacing all bad or suspicious splices with compression or rolled sleeves.

Sometimes the foregoing methods are not wholly effective in reducing line noise to a satisfactory level. In this case, another remedy may be utilized. This is improving the line balance with respect to ground and draining off the induced currents by one of the center tap arrangements shown in Figure 5.

Proper Adjustment of Harmonic Ringers

HARMONIC ringers are very difficult to adjust properly. This is due to the fact that this type of ringer is designed to operate on only one out of four or five different frequencies without cross ringing on other frequencies. The limits of adjustment are very close, much more so than on a straight line ringer of the pivoted armature type.

If the correct procedure is followed, however, it is possible to adjust each ringer to operate on its proper frequency. This work is best done in a shop where repair and testing facilities are readily available.

The first step is to clean the ringers and check the coils for continuity and d-c resistance. The coil resistance should approximate the catalogue capacity to make sure that the reed assemblies have not advertently been changed on the coils. (A few types vary in coil resistance, with the lowest frequency ringer having a higher resistance than the other higher frequency ringers in the series.)

Burrs on the pole pieces on the ringer coils should be filed off, bent armatures and reeds should be straightened. Weak permanent magnets should be recharged. (After this treatment the magnets should support a 4-ounce weight.)

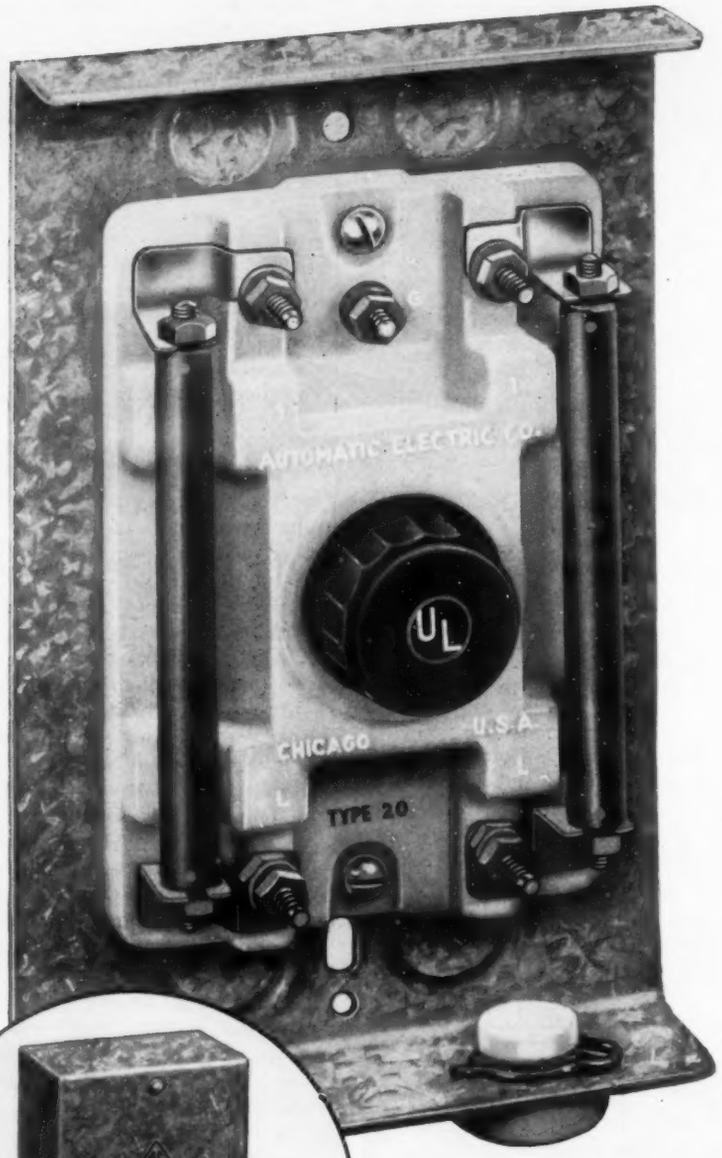
After cleaning and repairing the ringers, they are ready to be readjusted. For this purpose, a test cabinet with ringing keys for connecting the different frequencies from the harmonic ringing machine is required. This cabinet is also provided with a 2000 to 5000-ohm, 50-watt resistor arranged to be connected in series with the ringing leads or cut out as required. This resistor may be of the variable type if desired, but the adjustment is not usually critical.

With the gongs left off the ringers, turn the pole pieces down as far as they will go to obtain the maximum spacing between them and the armature. Check the spacing on each side of the armature with thickness gauges and make the gaps as equal as possible by readjusting the pole pieces.

Connect the ringer to the ringing leads and cut the series resistor into the circuit. Test the operation of the ringer at its proper frequency. If it does not ring satisfactorily, adjust the pole pieces a little closer to the armature, keeping the armature spacing exactly equal on each side. Repeat the test and adjustment until ringer vibrates satisfactorily at its correct frequency. Testing the ringer with the resistor cut out of the circuit will then result in a much stronger vibration of the clapper.

Test the ringer for cross ringing on other frequencies by operating the different ringing keys in turn and at the same time, cutting the series resistor in and out of the circuit. There should be no more than a slight vibration on the wrong frequencies at the most.

Assemble the ringer in the subset and attach the gongs to the ringer posts. With the gongs separated as far as possible from the clapper on



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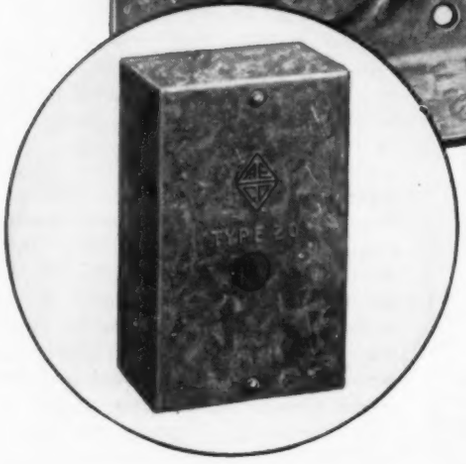

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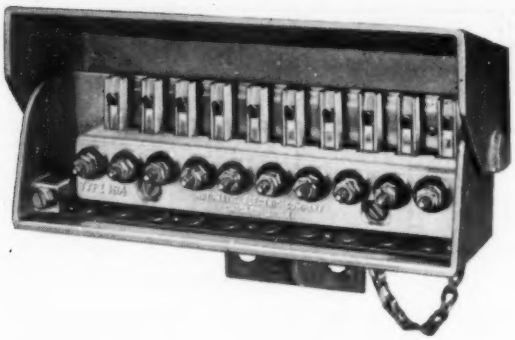
Cat. No. SB-88—Without cover, for indoor use—7 amp. fiber fuses.

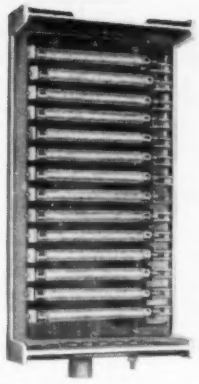
Other fuses available to order.



TYPE 19A CROSSARM ARRESTER

Here is multiple protection for cable leads or for use in drawing static from lines and reducing excess fuse operation. This light-weight, easy-to-install crossarm arrester is provided with ten discharge blocks with carbons. Type 19A Crossarm Arrester mounts on crossarm out of lineman's way. Hinged cover of durable sheet metal is easily removable.

Cat. No. SA-91—Type 19A Crossarm Arrester.



TYPE 40 PROTECTED CABLE TERMINAL

This compact 7-pair terminal has a high potential safety factor and assures complete cable terminal protection at all times. It is equipped with detachable mounting bracket which makes installation a simple one-man job. The metal protective cover, not shown, is reversible so that cable may be led in from top or bottom. Supplied with cable stub.

Cat. No. SA-34—Protected Terminal—3 ampere wood fuses.

matic Electric Protection will Save You Money!

You get protection that pays, when you install Automatic Electric protective devices. You profit because these rugged units are easy to handle and install, and because they give reliable service over the years with a minimum of maintenance attention. You profit, too, because these protectors really protect—keeping high potentials out of costly equipment and cabling. They've met the test of actual use under all conditions. And to further protect you, Automatic Electric substation protectors have been tested and listed by Underwriters' Laboratories, Inc.

The popular types of protective equipment shown here are all available NOW for immediate delivery. To get the finest protection—and get it quickly—order your selection from these pages.

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems

Makers of Telephone, Signaling and Communication Apparatus . . Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions

AUTOMATIC ELECTRIC SALES CORPORATION, 1033 W. Van Buren St., Chicago 7, U. S. A.

Export Distributors: INTERNATIONAL AUTOMATIC ELECTRIC CORPORATION

each side, connect the ringing leads to the ringer and with the clapper vibrating, turn the gongs one at a time until they barely make contact with the clapper on its widest swing. At this point, a good ringing tone will be obtained with the resistor in the circuit. Cutting the resistor out will then increase the ringing volume.

As a last step, test the assembled unit for cross ringing with and without the resistor. The set is then ready to go into service without further adjustment, provided that the ringing system is properly adjusted to operate on the required harmonic frequencies.

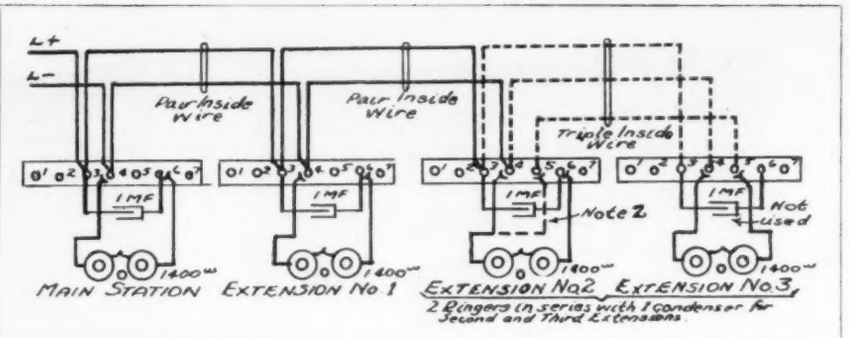


Fig. 6—Method of connecting main and extension stations on an individual line.

Connecting Ringers in Extension Sets To Reduce Line Capacitance

WHEN EXTENSION sets are bridged across a line, the line capacitance is increased due to the condensers in series with the ringers and the combination being shunted across the line. If the capacitance of the line exceeds 4 MF, the dial equipment will not function properly as the result of the dial impulses being distorted.

The remedy is to keep the line capacitance low, below 4 MF at all times. In the case of the newer instruments, this is done by using smaller condensers with high impedance ringers for maximum efficiency and to reduce line noise due to power line induction. The limit is four sets with high impedance ringers on an individual party line. The ringers are connected in multiple across the line in all cases.

In the case of instruments with low impedance ringers, the method is to limit the total number of main and extension sets to four on an individual party line where the ring condensers are 1 MF each and the last two ringers are connected in series with one condenser as illustrated in Figure 6. Refering to the illustration, the procedure is as follows:

(1) For main station and one or two extensions, connect the ringers in multiple as illustrated.

(2) For main station and three extensions, connect the ringers in the main station and extension No. 1 in multiple and the ringers in extension stations No. 2 and 3 in series with one condenser as per dotted line.

(3) Do not connect more than the maximum number of extensions shown including extension ringers. A fourth extension station without ringer (answering type) may be installed.

Extension stations are seldom used on a party line. If they are used, the same limit applies as in the case of individual party lines for two-party lines. Four party lines are limited to two instruments per station.

MEREDUC
TRADE MARK

PRESSURE TREATMENTS of Southern Pine Poles, Crossarms, Conduit, Cover Plank, Ground Wire Moulding with No. 1 Creosote Oil or Pentachlorphenol are carried in stock permitting prompt shipments of carload and less than carload orders. Mailing address: P. O. Station "A", Atlanta, Ga.

WILLIAM C. MEREDITH COMPANY, Inc.

Treating Plant: East Point, Ga. — Mailing Address: P. O. Station "A", Atlanta, Ga.

Telephone Directories ---

THEY SERVE EVERYBODY

BY LEONARD J. WYETH, JR.
Production Manager,
L. M. Berry & Co.

Telephone directories are a vital part of the telephone business; essential for good service and an important part of the equipment furnished by the industry to the public.

CLASSIFIED BUSINESS DIRECTORY

73-218 DOUG. 67 | AWOOD AUTO LIVERY | 39TH St. and PRAIRIE AVE.

Auto. 64-077 Day or Night Calumet 4077
Hoskins Taxicab Service
20th and WABASH AVENUE
Taxicabs, Limousines, Touring Cars, Renault Cars Exclusively

CALL 79-168
TAXICABS, LIMOUSINES AND TOURING CARS
South Motor Livery, 2511-19 So. State St.
Packards and Stearns in our service — Cal. 4444

Associations---Continued

44-686 National Association of Employing Lithographers, 25 N Dearborn
41-247 National German American Alliance Co, 64 W Randolph
63-967 National Independent Tel Assn, 332 S Michigan Av
68-155 National Salesmens Training Assn, 55 W Jackson
72-868 Negro Fellowship League, 2316 S State
34-657 Newspaper Enterprise Assn, 167 N 6th Av
52-999 On Leong Tong Chinese Mechants' Assn, 410 S Clark
44-552 Peoples Bldg & Loan Assn of Chicago, 54 W Randolph
70-335 Percheron Society of America, 826 Exchange Av
34-805 Shipmaster Assn The, 208 N 5th Av
74-259 South Side American Banking Assn, 2101 S State
33-078 State Executive Committee, 19 S La Salle
62-029 Steve Founders Natl Defense Assn, 216 S Wabash
64-186 Three-I Baseball League, 23 W Adams
65-386 Union Mf'g Garment Mfrs Assn of America 53 W Jackson
44-820 United Heating & Power Assn, 54 W Randolph
64-461 United Typothetae of America, 53 W Jackson
67-108 Western Freight Traffic Assn, 900 S Michigan Av
51-544 Wholesale Clothiers Assn of Chgo (Labor Bureau), 217 S 5th Av
65-050 Young Men's Christian Association (R R Dept) 313 Plymouth Pl
74-038 Young Men's Christian Assn (Wabash Av Dept), 2236 S State

Attorneys-at-Law
(See Lawyers)

Auctioneers

48-563 Gorman A L, 105 N Clark
54-553 Retail Merchants House, 105 W Adams
54-308 Taylor Method Co, 317-9 S Market
61-956 Whitemarsh Auction L & Co, 79 W Monroe

Auditors
(See also Accountants)

48-155 Nigg C, 1403 Schiller Bldg
41-608 Richardson Noel, 105 N Clark

Auto Lamp Repairing

61-407 AUTO LAMP REPAIR CO, 1132 S Michigan Av
60-841 AUTO MART CUT RATE TIRE & SUPPLY HOUSE INC, 58-60 E 10th St

Auto Lamps---Enameling

AUTO-LAMPS ENAMELED
RUBBEROID BLACK, ALSO FENDERS, WIND SHIELDS AND OTHER PARTS.
Prompt Attention and First-Class Work
FRANK J. LAMBERSON
JAPANNER AND ENAMELER
AUTO 57-98 — 18-16 SO. CLINTON ST.

Auto Livery

Carroso Auto Livery Co.
Mike Weinberg, Mgr.
ELECTRIC CHARGING STATION
1427 S. State St.

Page from Chicago telephone directory, dated February 1, 1913. Note third listing from top in left hand column lists the old National Independent Telephone Association.

TELEPHONE directories, since their inception in 1878, have become a vital part of the telephone business and are now essential for the maintenance of good service. Without them, telephone companies would be forced to provide sufficient "Information" positions to handle many more millions of calls than is currently necessary. This would mean greater capital expenditures and operating expenses with no financial return. For that reason, and also because the telephone directory is the quickest and most convenient method yet devised for finding telephone numbers and telling the public who sells everything in goods or services, the common telephone directory has become an important and familiar part of the equipment furnished by the industry to the public for supplying telephone service.

The first telephone directory in America, or anywhere for that matter, was published by the New Haven Telephone Company under date of February 21, 1878. It listed about 50 subscribers. The classified directory, embodying the "Where To Buy It" idea, seems to have been inaugurated about 1886. Today, there are many thousands of directories varying in size from one page cards to two volumes totalling more than 2,500 pages. In San Francisco an edition has even been printed in Chinese characters to serve the locality known as Chinatown. This is believed to have been the only Oriental directory in the Western Hemisphere. Each directory whether small or large, serves its community well.

Directory Requisites

Of the multiple phases of directory publication, there are four requisites: accuracy, reliability, usability and an attractive appearance. The first, accuracy, has caused many young men's hair to turn prematurely gray and sent older men to their graves. An important senator of a foreign country was inadvertently listed with the telephone number of a questionable character. A sweet, little, old lady was almost driven insane when her listing appeared with a large department store number. And so forth ad infinitum. While from the company's point of view, an error is only one in thousands of listings, it is all important to the individual or entity involved. Therefore, efforts are constantly being made to eliminate errors entirely, but while the human element is essential to directory production, there will always be some errors. The best than can be hoped for is to keep them to a minimum.

Accuracy is the basic consideration affecting reliability. However, the frequency of issue and authenticity of the information between the covers have a direct bearing upon the acceptance of the directory. The telephone directory is the most complete reference guide of individuals, firms, and products available in the community. As it was so shrewdly stated by an inmate of an insane asylum who had scanned a large directory from cover to cover, "Terrible plot, but what a cast!"

The public is stubborn. In times past, it has had to be gently coaxed to use this great book. The most accurate and reliable issue will be cast aside by some people if both the outside and inside are not presented in an attractive package. Complaints are received if the type is too small or too large, if advertisements interfere with listings or vice versa. There is no happy medium, consequently there is a continual quest to improve

Automatic
Telephone Directory
Chicago

A

For all LONG DISTANCE points beginning with "A" call "Long Distance" on dial.

A A 1 Co Auto Repr 2953 E Michigan Av
A B C Laundry 2251 S State
A B Freegrading Co The 14 W Randolph
A E & C R R Co Exp Of Toll
A E & C R R Co Nevs Stand Toll
A E & C Station Toll
A M U Publishing Co 32 E Clark
A & A Coffee Co 542 E 43d
Aagesen Paul Res Toll
Aaid System Signs & Awnings 1148 S Wabash Av
Aaron B & Sons Comm Mchts 56 W Ro Water
Aaron E A & Bros Comm Mchts 72 W Ro Water
Aaron Edward A 72 W Ro Water
Aaron Edward A Res 4358 Prairie Av
Aaron Electric Co 121 E Clinton
Aaron H J Lumber 160 W Van Buren
Aaron Hugo, Pants & Shirts 325 S Market
Aaron Louis 56 W Ro Water
Aaron Mark, 01 W Ro Water
Aaron Max 72 W Ro Water
Aaron & Heilman Co Comm Mchts 329 W Ro Water
Aarons N Gov 3139 S State
Aatlas Window Shade Works 163 S Wabash Av
Aawood Auto Livery 2367 Prairie Av

ABALON HOTEL 1026 Indiana Av
Private Exch Telephone in Every Rm

Abbate, Antonio Barber 841 Wells
Abbe Christ Res Toll
Abbe Wm Res Toll
Abbey C P Lawyer 7 S Dearborn
Abbott David Painter 618 Wells
Abbinanti M S Barber 412 W Chicago Av
Abbinanti M S Res 822 Townsend
Abbinanti Mike Barber 216 Wells
Abbott Kate Res 863 E 54th
Abbott Lawrence Res Toll
Abbott Linot Metal Wks 816 S Wabash Av
Abbott Typewriter Exchange 26 S Dearborn
Abbott A A 102 W Monroe
Abbott A H & Co Artists Matls 127 N Wabash
Abbott Arthur H 127 N Wabash
Abbott D J Res Toll
Abbott E M 310 Cliff
Abbott L H 2123 Res Toll
Abbott Frank D 150 N Dearborn
Abbott George Res Toll
Abbott Marta Res 2150 Dearborn Ct
Abbott Marta Res 2105 S Wabash Av
Abbott & Rich Lawyers 38 S Dearborn
Abel C Gen Toll
Abel F 2219 Res 5209 Indiana Av
Abel Louis Lgts Wind 24-43 N Market
Abel Theodore C F MD 7 W Madison
Abel W H Res Toll
Abel Wm Res Toll
Abell E J MD Gen Toll
Abell E J MD Res Toll
Abendgast Co The 141 S 5th Av
Abens Henry Res Toll
Abens Mrs L Res Toll
Abens M & Son Gen Toll
Abernathy B Res 3144 S Wabash Av
Abernethy H W Res Toll
Aberg John Paint Toll
Abhister A Gen Toll
Able Transfer Co 147 N Market
Abloomis M Gen Toll
Ablin H Exp Coal & Prod 2402 S State
Abney F Exp 4248 S State
Abrahams A Res 4345 Cot Grove Av
Abrahams Jos Undtkr 742 E 47th
Abrahams Mrs Lucy 4345 Cot Grove Av
Abrahams Sam Res 222 E 46th
Abrahamson Ben Flowers 2456 Fast 56 Av
Abrahamson Bros Cibs & Butts 443 S Market
Abrahamson & Chystal Hits & Pipe Trll
Abram Abe Co Stain Shutters 24 N 5th Av
Abramowitz B 3244 Ave H 35th
Abrams Morris M 7201 Cot Grove Av
Abrams S Exrs The 115 N Dearborn
Abrazet E The 434 W Madison
Abt Herman H 750 S Market
Abt Jacob J 204 S Market
Abt L C Sons Wood Carving 204 S Market
Abt Levy 208 S Market
Abt Solomon L 204 S Market
Accident Ins Brokers 33 N 5th Av
Accettura N Grocers 550 3290R
Accurate Supply Co Loose Leaf Forms 28 S Dearborn
Accuracy Laboratories Analytical Chemists 1144-50 W Monroe
Accuracy Letter Service 715 S Dearborn
Accommodation & Loaned Prd Res 715 S Dearborn
Achenbach Chas Curios Trll
Achenbach Emil Paint Stores Trll
Ackerling Henry E Grocer 247 W Madison
Ackerman Albert Res 1st Friend
Ackerman Bernard Gen Toll
Ackerman Henry Res Toll
Ackerman & Ackerman 39 W Huron
Ackerman Mrs S Res 536 E 37th
Ackerman-Weis Co The Retail Service 522 S Dearborn
Ackroff Henry 22 S W Jackson
Acland B J Res Toll
Acosta Charles F 1 Oak Hill N State
Ackley Geo Res Toll

ANGEL CLEANING and DYEING CO. ORIENTAL RUG and CARPET CLEANERS COMPRESSED AIR and NAPHTHA PROCESS
Main Office, 108 E. 51st St. New Hyde Park Masonic Temple Works, 509 W. 634 St.
Tels.: Oakland 4596 Auto. 72-673 Went. 678 -:- H. S. ANGEL, Mgr.

Old and new methods of directory listings are shown in above pages taken from the 1913 directory of Illinois Tel. & Tel. Co. (left) and the 1948 Chicago directory of the Illinois Bell Telephone Co. (right).

the usability and attractiveness of each issue, by designing special typefaces; by eliminating all advertising from the alphabetical section; and by transferring cover advertising to the classified directory. From these experimentations, the all-classified directory has been developed as a quick, easy reference medium which has been heartily accepted by the general public. It has eliminated the favoritism accorded to a few cover and specialty advertisers. It has placed all advertising in a rational sequence for ready availability, rather than chance discovery when scattered throughout the directory.

Today's Directory

Today, the telephone directory as we know it, generally contains the alphabetical and classified sections. Street address directories are issued in some localities, for the use of special customers. In the foreign field, the picture is completely changed. In Rio de Janiero, all subscribers are provided with alphabetical, classified, and street directories in three volumes. Southern Brazil eliminates the street address section but adds a professional directory. Not to be outdone, Spain provides all four in addition to a trade directory (at a slight extra charge, naturally) covering all businesses in Spain. Shanghai prints two complete directories, one in Chinese and the other in English. Why foreign administrations undertake such diversity remains a mystery, but it has been discovered that once bad habits are started, they are difficult to suppress.

The alphabetical directory does not present much of a problem except for accuracy. The prospective subscriber appears at the business office of his Telephone Company. The charm of a service subscriber sets him at ease, and the necessary data is compiled. If the subscriber-to-be filled out his application a year or two ago, he had spent nights perfecting a story, not always exactly based on fact. However, assuming a reasonable chance of being a subscriber in the near future, his name, exactly as he gives it will appear in the next issue of the alphabetical telephone directory. Also, if this is to be business service, a classified heading is decided upon. Occasionally when the directory is mentioned, the individual states his desire to be listed at the top of the outside column on page so-and-so. This desire may stem from the fact that page so-and-so is his lucky number, his wife's weight, or any of a thousand reasons that come to a man's mind. The solution is either to rearrange the whole directory to suit the customer, to change his name, or let him fall where he belongs and accept the complaint. The latter course is usually taken.

This whole process is efficiently handled, and, in the austerity of the telephone company's office, the prospect is on the defensive. He meekly accepts the authority of the well-trained commercial employee, and disagreements are generally kept to a minimum.

Proper Classifications

For the residence subscriber, with the installation of the telephone and the correct listing in the directory, there is very little further personal contact with the telephone company, unless, of course, the monthly statement is overlooked. On the other hand, if the application is for business service, the individual can expect, at least, an annual visit from an agent of the telephone company who will demonstrate to him reasons why, and how, this or that item will benefit his business, give prestige, etc., etc.

These annual visits are by no means one sided. To begin with, a standard list of headings is issued, and each business customer is classified under the one that most nearly describes his type of business. To many people,

Page from 1913 Chicago directory (left) and page from 1948 Chicago directory (right) illustrates changes in styling of classified directory section that have been made since "Teaming" was an important listing.

it is inconceivable why there is no heading that exactly describes their business to the last detail.

Once proper classifications have been arranged for, there is a constant battle for social betterment. Hence, "Slaughter Houses" become "Abattoirs"; "Undertakers" become "Funeral Directors," etc. Furthermore, every type of business has a cross to bear. Probably the most justified are the "Restaurants." Invariably their listings directly follow "Rendering Companies." Those unattractive advertisements offering to buy deceased animals cause the Restauranteurs to lose their appetites, and undoubtedly many prospective customers suffer the same malady. However, some rather amusing sequences have appeared, for instance; "Bricks-Used" followed by "Bridal Bouquets"; "Cashiers' Cages" by "Casino Games"; "Caskets" by "Castor Oil" and "Casualty Insurance."

The salesmen bear the brunt of these complaints in addition to the routine objections that are caused by natural resistance to any sales presentation.

A large number of business telephone subscribers believe that the classified telephone directory is the best medium of advertising of its type. Too many people think of telephone directory advertising as competitive to billboards, radio comercials, newspapers, and magazines. On the contrary, those forms of advertising acquaint the public with names, nature, and uses of salable commodties; attract attention; arouse interest and a desire to possess. The demand having been created, very often a person is at loss to know "where to buy it."

The classified directory is an accurate means of directing the buyer to the seller at the same time when serious thought of purchase is contemplated. That is the substance of directory salesmen's sales talk. It is impossible to measure in dollars and cents the exact portion of national sales directly attributable to advertising in the directory, but it must be very large judging from the number of customers who renew year after year. In a way, directory advertising is the equivalent of adding another salesman, or perhaps several additional salesmen, to the advertiser's sales force.

Every salesman hopes that his sales talk will sufficiently convince the prospect, to cause him to buy. To get that precious signature there are various forms of representation permitted in the directory, from a single extra line to a large display with considerable art work. The good sales representative evaluates the prospect and attempts to outline a program that will fit his need. Professional men have no need for the larger items. Banks tend towards prestige advertising. Highly competitive organizations rely upon the larger displays with listings under all of the main classifications pertaining to their businesses.

After many experiences, amusing and otherwise, the directory is ready to close and be sent to the printer. Naturally, there is the last minute rush. It seems that many advertisers, on the day before closing, have to change one or more words in their advertisements. Some are successful, while others will have to wait a year. The few remaining days between the close and the date that the material must be in the printer's hands are spent carefully checking and rechecking every contract and preparing the necessary instructions to the printer. On the day that everything clears the office for the printer there is a long sigh of relief on the part of those who have been working on the copy.

A "Modern Miracle"

In due course the printer delivers the finished product to the telephone

KLEINS

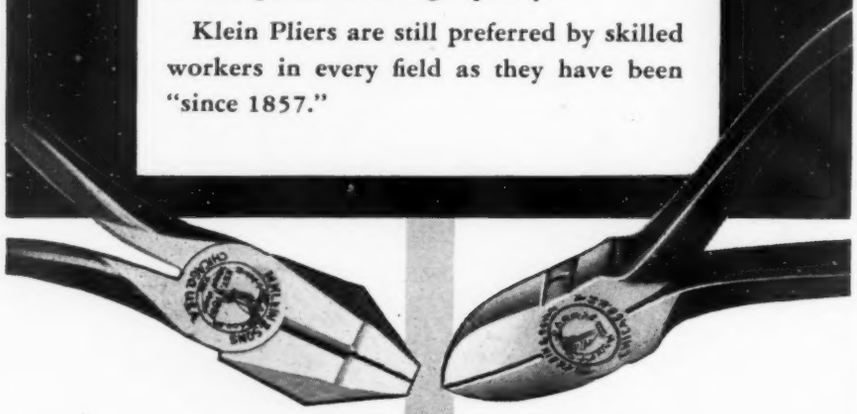
FOR MEN WHO WANT

the Best

• Ever since the first communication and power lines were strung, Klein Pliers have been the favorite tools of electrical workers.

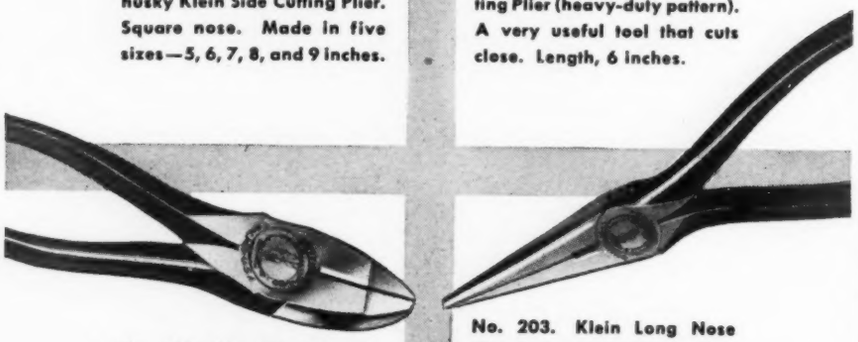
Today, Klein Pliers are made with the same exacting care that has won these tools their reputation for high quality.

Klein Pliers are still preferred by skilled workers in every field as they have been "since 1857."



No. 201. Original pattern husky Klein Side Cutting Plier. Square nose. Made in five sizes—5, 6, 7, 8, and 9 inches.

No. 242. Klein Oblique Cutting Plier (heavy-duty pattern). A very useful tool that cuts close. Length, 6 inches.



No. 201 NE. The famous "streamlined" Klein Side Cutting Plier. Made in five sizes —5, 6, 7, 8, and 9 inches.

No. 203. Klein Long Nose Plier. Long reach of jaws permits getting into difficult places. Made in 6 and 7-inch sizes.

The Klein Pocket Tool Guide, showing the Klein line and containing useful tool information, will be mailed on request.

Established 1857

Mathias KLEIN & Sons

Established 1857 — Chicago, Ill., U.S.A.

3200 BELMONT AVE CHICAGO 18, ILL.

company. Telephone directory printing is one of the modern miracles. Mammoth presses print, cut and fold sections of a directory in a matter of seconds. Gathering machines collect the various sections, staple them and glue on the covers. The printing time for the largest directory, which may comprise more than a million copies, seldom exceeds one month.

The delivery by the telephone company can be made in two ways; small directories are often mailed from the printing plant to each subscriber; the larger issues are hand-delivered; and to avoid confusion with the new directory, the obsolete directory is picked up to be sold as scrap paper.

Upon receipt of the new book, a mass reaction seems to occur. Every person looks to his own. If the slightest error should appear, indignation and threats of suits are sometimes voiced. All the meekness of the first contact with the company disappears, and hapless employees are roundly berated by those unfortunate subscribers who are the victims of errors.

There are a few advertisers who are chronic complainers. Directly after the new issue has reached their offices, they write scorching letters pointing out that their advertisements are not as ordered; therefore, they feel that no benefit is derived; and for that reason some adjustment in charges should be made. It is the eternal struggle to get something, anything, for nothing. On the other hand there are some very justifiable complaints, and the company willingly adjusts such accounts.

After a large directory is published, there are always a few indominable characters who issue statistics about the book with a "cast." The number of "Smiths," "Browns" and "Greens" is compared with previous issues; how much the absorption of moisture during the issue's life will increase its volume; to whom the first and last numbers of the alphabetical section pertain come up for discussion.

And lastly, the telephone directory provides a source of entertainment at parties and to juveniles. Many a book has been torn in two by local strong men before admiring females. Aquariums and zoos receive their share of the wrong end of jokes. But with all the complaints, jokes and headaches, the telephone directory remains the most complete reference book of individuals and industry, and is the only reference medium instantly available to everyone everywhere to answer every buying problem for products and services.—THE END.

The 51st Annual Convention

of the

UNITED STATES INDEPENDENT TELEPHONE ASSOCIATION

will be held at

CHICAGO

STEVENS HOTEL

OCTOBER 11-12-13

ALL INDEPENDENT TELEPHONE PEOPLE
ARE CORDIALLY INVITED TO ATTEND

★ ★ ★

Outstanding Speakers ***Inspiring Messages*** ***Exchange of Views***

★ ★

GENERAL SESSIONS

- Management's Responsibility
- Service and Financial Problems
- The Labor Relations Front
- Help for Small Companies
- Mobile Radio Demonstration
- Public Relations

DEPARTMENTAL CONFERENCES

- Maintenance and Operation
- Exhibits for Rate Cases
- Carrier Systems
- Radio Telephony
- The Bell Transitor
- Traffic Problems

★ ★

MANUFACTURERS' EXHIBITS **U-S-I-T-A ANNUAL BANQUET**

★

PIONEERS' MEETING

★

ENTERTAINMENT
and
GOOD FELLOWSHIP

UNITED STATES INDEPENDENT TELEPHONE ASSOCIATION

411-17 Munsey Building, Washington, D. C.

Fig. 1—Map of U.S.A. (and adjacent Canadian territories) showing toll numbering plan areas and tentative three-digit area codes.

Equipment Facilities For Intertoll Dialing

A brief description of the nationwide toll dialing plan, with special reference to its effects on, and advantages for, Independent operating companies, is followed by a detailed discussion of the equipment features required in manual and automatic exchanges (especially toll centers) and methods of dialing over toll circuits.

By F. L. Kahn

Telephone Systems Engineer
Automatic Electric Company

INDEPENDENT telephone companies are destined to play an important part in the nationwide operator toll dialing plan. This long range program contemplates that outward operators at an originating toll center will set up and extend toll calls on a nationwide basis directly to the called terminal; the assistance of any inward or through-switching operators will not be required if the call is destined for a subscriber in an automatic exchange. The new operating techniques for this modern high-speed toll service are often referred to under the shorter term "Intertoll Dialing." This article will deal principally with equipment facilities for this service.

Cooperation of the Independent companies in this program will be of distinct and immediate benefit to the industry and will bring about noteworthy improvements. Toll calls will be extended more rapidly; the increased speed of completion will be especially pronounced on switched calls. Faster and better service will create more toll business. Outward operators will be able to handle more calls due to quicker completion of calls by dialing, dependable visual supervision and almost instantaneous clearance. And for the same reasons, the revenue producing time of toll circuits will be materially increased. Inward and through-switching operators will be almost completely eliminated except in manual offices. More

toll business will be handled by a smaller number of operators due to the extensive use of automatic switching facilities.

Initial Steps Towards Intertoll Operation

THE INTRODUCTION of intertoll dialing in any exchange affects directory numbers, operating practices and equipment facilities. The major elements requiring advance planning are summarized in the following five paragraphs and are enlarged upon in subsequent sections.

(A) Operating companies with local automatic switching equipment in service or on order should, at the earliest opportunity, have their directory number systems coordinated with the office names and codes within the same area. This is desirable to obtain the benefit of uniform routing instructions. The foresighted Independent company may be able to retain and conserve its present or future numbering scheme by showing an immediate interest in this matter. If such interest is delayed, present or desirable numbers, office names or exchange codes may have been assigned to other exchanges.

(B) Toll boards, even in manual exchanges, must be arranged for dialing or key pulsing, as outward toll calls will be completed by dialing.

(C) Toll circuits must be converted from ringdown or d-c signalling to automatic operation. All terminating equipment must be designed for dialing.

(D) In automatic exchanges, switching equipment must be provided for direct completion of all inward calls to local subscribers, and to automatic tributaries; also for reaching inward delayed call (Tx) and information operators by standard nationwide dial codes.

(E) Operating procedures and routes must be established for handling toll calls by dialing. For this purpose, a numbering pattern and switching methods are being set up as outlined hereunder.

Numbering Plan

THE BASIC concept of the nationwide dialing plan is founded on creating about 80 toll areas (sometimes called numbering plan areas) to simplify the routing of long distance calls. These areas, in many cases, will coincide with state areas; but several important and populous states may each be divided into several areas. (See Figure 1.) Each area will be identified by a specific three-digit code.

Within each area, larger offices will be selected by codes of two or three letters or numerals corresponding to the name of the exchange or office wherever feasible; smaller exchanges will be given arbitrary three-digit codes. In all cases, the codes will be followed by four or five numerals representing the station number. Thus, each subscriber within a specific area can be identified by a seven-digit or eight-digit number Due to existing duplications in the first two or three letters or numerals of existing offices, codes within each area must be coordinated before intertoll dialing can be introduced. *This will sometimes necessitate changes in existing numbers of present automatic exchanges.*

For inter-area calls, a toll operator will normally dial ten or eleven digits consisting of the three-digit area code followed by the seven or eight digits that identify the called office and terminal. For a toll call between two exchanges located within the same area, the area code need not be dialed. Depending on routing and destination, the toll operator will dial the number of the called terminal preceded, *if necessary*, by the office code or by other routing digits. If the call is for a multi-office exchange, seven digits will be the normal pattern for calls within an area.

Control Switching Points

A THREE-DIGIT area code can suffice for nationwide service only by employing special electrical facilities that will automatically perform the functions of routing operators. These special devices which we may call "electrical brains", need be available only at major toll switching centers. In the nationwide dialing pattern, the present eight regional centers, most of the present primary outlets and a few important toll centers will become Control Switching Points (CSP's). For exchanges of this type, Automatic Electric Company has made available a "Toll Director Switching System"; the Bell System is normally employing a "Crossbar Toll Switching System" for such exchanges. Both types of equipment are characterized by one common feature: a register-sender-translating device receives and stores the called number, analyzes it for best normal routing, and automatically dispatches the call over the normal route or over one of several alternate routes. A toll call may pass through several CSP's and may repeatedly receive the benefit of automatic routing. These register units can translate area codes and office codes as required.

Only a few important Independent exchanges will become Control Switching Points and accordingly need to be directly concerned with the special facilities required at CSP's. Most Independent exchanges are either *toll centers* or tributaries. For this reason, this article will deal principally with the intertoll dialing requirements of a toll center exchange. Many tributary exchanges will be automatic. Such exchanges as well as small manual magneto or common battery tributary offices will continue to have their calls handled by and through their toll centers.

The nationwide numbering plan is

FREDERICK L. KAHN

Frederick L. Kahn received his education and initial communications experience in Germany. He joined Automatic Electric Company in 1923 as an equipment engineer. Subsequent assignments led him into traffic engineering, cost studies, systems analysis and design. Since 1935, Mr. Kahn has held various supervisory positions in the technical organization and is at present in charge of circuit design and apparatus and circuit testing. Because of his broad knowledge of telephone switching systems and his keen analytical ability, he is frequently called upon for consultation in matters involving application of switching systems to specific requirements.

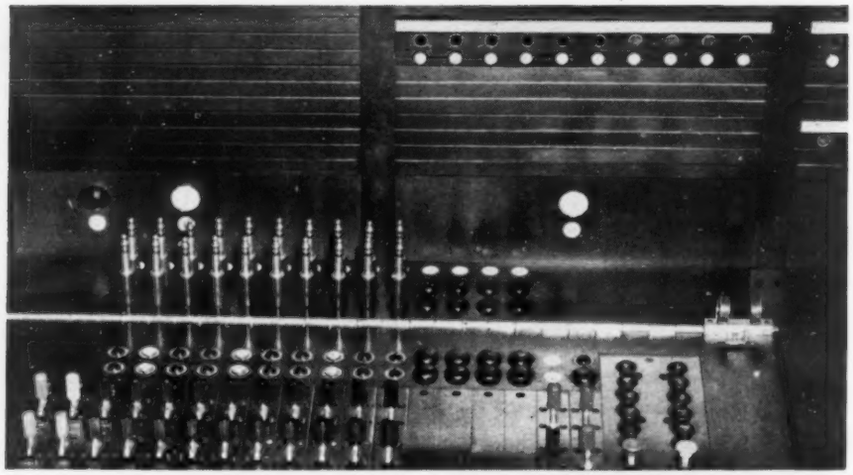


Fig. 2—Manual toll board keyshelf showing keyset at lower right.

designed to provide a simple routing guide, for use whenever calls are extended through a CSP. At a toll center, many calls can be completed over direct circuits to other toll centers. On calls not extended through a CSP, the toll center operator will dial only as many digits as required for the best direct or alternate routing of calls; this may involve four, five, six or more digits—generally less than seven digits. When a toll center has direct circuits to a toll exchange in an adjacent toll area, the toll center operator need not dial the area code, thus saving three digits. This simplified procedure will apply to many short haul calls and will be appreciated for the resulting time saving. The regular seven and ten-digit patterns are most useful for handling calls to the more frequently called major cities. With proper instruction of outward operators, only a small percentage of toll calls will require any reference to routing guides or route operators.

Supervisory Features

UNIFORM visual supervision is an essential operating requirement with nationwide toll service. All equipment involved in the setting up of an intertoll call, from the originating toll center to the called terminal must give the outward operator positive visual lamp supervision of the progress of the call, including busy, answer, recalls and end of conversation. The originating operator has the sole responsibility of extending, timing and releasing a toll call. The provision of dependable visual signals materially reduces the time spent for answer supervision, speeds up the release of toll circuits and improves timing of tickets.

Where new equipment is on order or planned, intertoll facilities can be incorporated initially. Equipment in existing exchanges can usually be adapted for the special requirements by circuit changes and modifications.

The special intertoll facilities are described and discussed in the following sections: Where specific data are given they are based on equipment and methods of Automatic Electric Company.

Toll Switchboard Modifications

TOLL switchboards must be arranged for dialing or key pulsing. Modern toll boards are equipped or wired for cord circuit dialing. Older boards may require considerable modifications for dialing. The changes can sometimes be simplified by providing dialing by means of separate dial jacks and dial cords. Provision of a dial pilot lamp on each position is also desirable.

The dial pilot lamp indicates to the dialing operator whether the switching equipment at the point of origin or at any intermediate point is ready to receive dial pulses. The operator is instructed to start dialing or to continue dialing only when the dial pilot is lighted.

There are only two operating conditions necessitating this safeguard. One is the small automatic tributary exchange without incoming selectors, or connectors, where toll circuits are terminated on line equipment. A toll call can be extended only if an idle linefinder is available, and after it has found the calling toll circuit. A "stop-dial" signal sent back to the originating exchange darkens the dial pilot lamp temporarily until the equipment at the tributary exchange is ready to receive dial pulses.

The other case occurs on circuits terminating at a control switching point (or any other exchange employing switching equipment of the register type). Dialing must not proceed until an idle register is attached to the calling toll circuit. Registers are provided only in limited numbers and delays may occasionally be incurred; hence the need for a "stop dial" signal.

All automatic (cordless) toll boards are equipped with *keysets*. Keysets and *keysenders* are also offered by several manufacturers as optional facilities on all new manual toll switchboards (Figure 2). Keysenders increase the speed of extending calls to automatic exchanges materially. An operator after "keying up" the called number may immediately retire from a connection, and work on another call while the first call is still in the process of being extended. She need not wait for the answer by the called party as she obtains further supervision ("line busy" or "call answered") by the cord circuit supervisory lamp. On a seven-digit call, the operating time is reduced by at least five seconds: and the time gained is correspondingly higher on calls with more than seven digits. Keysenders obviously are desirable and advantageous whenever a large percentage of toll calls (outward and inward) is extended through automatic equipment.

When toll boards have keysets instead of dials, a "stop-dial" signal will affect only the sending of the various digits from the sender equipment. The calling operator, once a sender is attached to a call may, under all conditions, set up the complete number on the keyset without regard to the conditions encountered in extending the call; she is not held up by any "stop-dial" conditions.

In addition to these positional features, toll boards arranged for intertoll service must be equipped with suitable dial trunks for all intertoll circuits. Furthermore, terminations (jacks, lamps and relays) will be required for one-way trunks from auxiliary toll selectors to inward and Tx positions. These circuits are arranged for two-way signaling; when a call is established, it is possible for the originating or the called operator to signal the other operator by operating a ringing key (as in manual practice).

Toll Circuit Dialing

IT IS NOW practicable to dial over any type of toll circuit that may be used for intertoll service. The method most suitable for any specific case is dictated by the electrical make-up of the toll circuit and to some extent by the ownership of the toll circuit. Short haul toll circuits

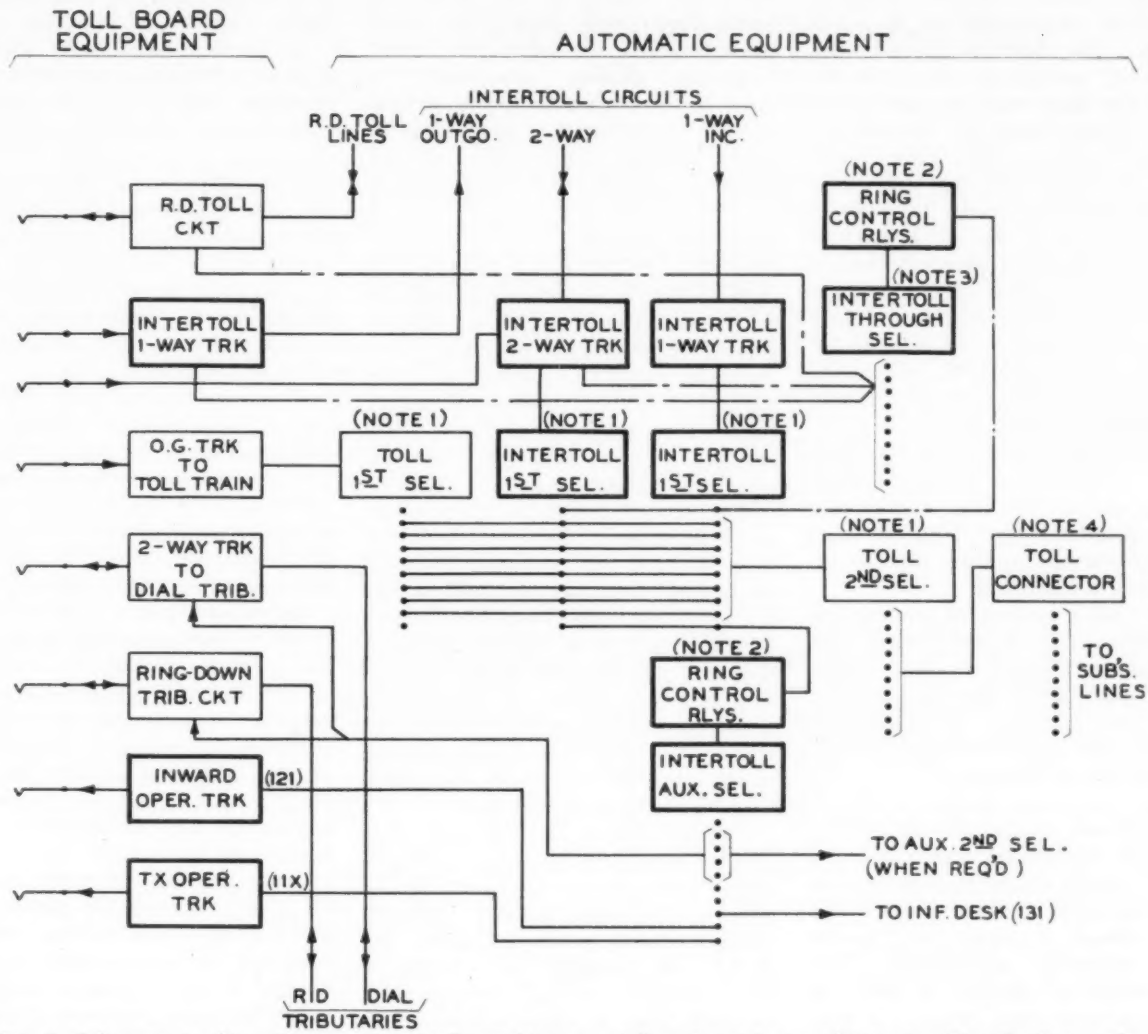


Fig. 3—Schematic trunking diagram of intertoll switching in a toll center exchange. (Note: 1—either the first or the second toll selectors may be arranged to serve as transmission selectors. 2—Ring control relays are furnished only when access to ring-down circuits is required from intertoll selector levels. 3—Intertoll through selectors are not always required in a toll center exchange. Connecting paths are accordingly shown as broken lines. 4—Toll connectors may be of "combined toll and local" type.)

will normally be operated on a d-c dialing and signaling basis. Most toll circuits terminated on Independent toll centers are in this class.

Loop dialing is the simplest and least expensive method and is generally suitable for circuits up to 3000 ohms loop resistance if the circuits are not phantomed or composited. Such favorable conditions are normally encountered only in metropolitan areas where non-quadded cables are used. Loop dialing should be considered only when there is no possibility of later addition of phantom circuits.

Simplex (Sx) or composite (Cx) dialing is used when the circuit resistance is too high for loop operation or when the toll circuits are phantomed. Two different methods of Sx-Cx dialing are extensively used in intertoll dialing. The method preferred by Independent companies employs battery pulsing, and battery and ground signaling. It is giving very good results over the short-haul circuits usually encountered in Independent operation.

Another and more expensive method is used by Bell System companies and generally specified for Bell owned, or partly Bell owned circuits. The Bell System calls it the composite signaling arrangement; this method is essentially the same as that of differential duplex telegraph operation and is sometimes referred to by the term "duplex signaling."

A sensitive polarized Western Electric relay is the most essential element of this circuit. This Cx signaling relay and an associated balancing network are provided by Bell System companies as part of their toll line termination for Bell owned circuits. It can also be supplied by Automatic Electric Company when Independent companies desire to purchase these items. The Cx-signaling relay should not be confused with the composite (Cx) sets required on composited circuits. Any well balanced type of composite set may be employed with the Bell type composite signaling circuit.

Two types of composite signaling relays account for two widely different operating ranges: one for short haul circuits, with a maximum loop resistance of 4800 ohms of toll cable or 100 miles of open wire; the other for longer toll cable circuits, with a maximum loop resistance of 12,000 ohms.

The Bell type composite signaling

circuit incorporates compensation for such variations of ground potential as may be encountered on long toll circuits. The first mentioned "Independent" method is inherently designed for short haul operation and makes no allowance for ground potentials. On short toll circuits, variations of ground potential are rarely of sufficient magnitude to prevent operation (except for the occasional short time effects of magnetic storms that play havoc with all communication circuits). However, should such variations normally exist between Independent toll centers, the composite signaling method should be selected, irrespective of distance.

A-C dialing: where d-c facilities are not available for dialing or when toll circuits are too long for d-c operation and have several intermediate repeater stations, dialing and supervision use a-c methods.

Alternating current of commercial frequencies (50 or 60 cycles) has been and is utilized in this country on a small scale for dialing over short haul circuits. Its limitations make it little suited to intertoll dialing over longer distances.

Voice frequency dialing (VFD) is the preferred method of a-c dialing over toll circuits because voice frequency signals can be passed through voice repeaters or over carrier circuits without requiring any special pulse repeating equipment. This most universal method is also the most expensive one; hence it is used only where d-c methods cannot be employed.

A VFD system employing a pulsing frequency of 1000 cycles is available for requirements of Independent companies wherever applicable. Independently owned toll circuits generally are not long enough to call for VFD operation. The need will arise more frequently on Bell owned circuits terminating at Independent exchanges. The Bell System method of VFD for circuits terminating in toll centers uses a dialing frequency of 1600 cycles over four-wire circuits, or 1600 and 2000 cycles over two-wire circuits. It is the practice of the Bell System companies to furnish the VFD units as part of their own terminating equipment at Independent exchanges. The Independent company provides only the associated trunk circuit equipment.

Higher frequencies (above the normal voice frequency range) offer a third method of a-c operation. *Dialing at carrier frequencies* is incorporated in several types of carrier systems; the method is as flexible and dependable as VFD. Carrier frequency dialing is also used and particularly well suited for radio toll circuits. A system of carrier frequency dialing, essentially the same as for carrier telegraph service, is also available; this method is in some instances preferable to voice frequency dialing, and less expensive.

Automatic Intertoll Switching Equipment

METHODS of extending calls to subscribers, operators, tributaries or to other toll circuits follow the usual pattern of automatic operation, involving no radical departure from other types of switches. The special features of intertoll service, however, introduce new functions which are reflected in the terminology of the equipment. The intertoll equipment is fitted into and superimposed on the normal local and toll switching facilities. It can best be explained by reference to a typical trunking diagram of an automatic step-by-step exchange, shown in Figure 3.

All intertoll circuits terminate on one-way or two-way trunk circuits which perform essentially the function of an impulse repeater.

Intertoll train: An intertoll first selector is required for each intertoll circuit that gives two-way service or one-way incoming service. Calls to the subscribers in the toll center exchange are extended over levels of this selector to second selectors, and through them to other selectors and connectors. Visual supervision is a primary requirement. All connectors are arranged to give hookswitch supervision. All selectors accessible to intertoll operators must provide an all-trunks-busy signal of 120 i.p.m. The connectors must send both visual and audible signals of 60 i.p.m. The audible signal is for the benefit of the calling party. Toll operators using keysets will have cut out of the connection before pulsing is completed. The calling party upon hearing the busy signal will usually hang up even before the operator has observed the flashing supervisory lamp. Thus she is spared the effort of asking him to hang up. This saves more time on many calls.

Visual supervision for toll operators over calls from the toll board to lines in the same exchange is normally incorporated in modern toll trains. Wherever such a toll train is available, the toll intermediate selectors and the toll connectors may be used jointly for calls from distant operators or operators in the same exchange. The principal new equipment required exclusively for intertoll service consists of the trunk circuits and the intertoll first selectors.

In existing automatic exchanges without a toll train, toll intermediate selectors must also be furnished, as well as some toll connectors for each connector group. (Toll connectors will usually be of the "combined toll and local service" type.) In older exchanges with toll trains providing only audible busy signals, toll selectors and toll connectors can usually have visual (flashing) busy signals added so they are suitable for intertoll calls.

The conventional toll switch train has a "transmission bridge" in a switch ahead of the connectors. Such a bridge is also required in the intertoll train. The transmission bridge is normally incorporated in the intertoll first selector. However, in multi-office areas and some other instances, it is generally more economical to locate the transmission bridge in the toll second selector.

The intertoll switch train is arranged for automatic ringing start. It makes no provision for reringing nor for collecting or refunding coins from prepay stations. (Inward collect calls must be completed through the inward operator.)

Auxiliary toll selectors: Auxiliary toll first selectors are connected to the first level of the intertoll first selectors in every toll center exchange, to provide access to toll and information operators and to tributary toll circuits. Standard nationwide code numbers are assigned for operators' trunks. Inward operators who may have to be called for inward collect calls, unanswered or other special services, are reached through 121. Delayed service (Tx) operators are reached by a call number starting with 11 and ending with one or two digits to identify the Tx service group or position. Toll information operators are reached through 131. Other special three-digit codes (151, 101) may be needed in larger offices, but rarely in toll centers. Several levels of the auxiliary first selectors will always be available for trunks to tributary offices. The special service codes for tributary trunks must not exceed three digits, and will in all cases begin with the digit 1.

In small toll centers, a two-digit selector is particularly useful as an auxiliary toll selector. This switch permits connection of more than one trunk group to a level, provided the total trunks of the several groups on a level do not exceed ten. As a tributary toll circuit groups frequently

are very small (two, three or four trunks per group), a two-digit selector can accommodate a considerable number of trunk groups in excess of the ten groups normally available with regular (one-digit) selectors. It will thus frequently suffice for all trunks to operators and tributaries.

When initial or ultimate requirements call for more terminals than this special type of selector would accommodate, auxiliary toll second selectors may be connected to one or several levels of the auxiliary first selectors.

Toll trunks to ring-down tributaries must be preceded by *ring control relays*. Such a relay group automatically sends out a splash of generator when a ring-down trunk is seized by an intertoll operator. It also repeats ringing signals in either direction when either the calling or the called operator should wish to signal one another after a call has been established. Relay groups for ring-down service are normally connected ahead of the auxiliary first or second selectors when there is a large number of ring-down circuits. The ringing feature, however, is effective only on calls made to ring-down circuits. When only a small number of ring-down tributary circuits are connected to the auxiliary selectors, it may be more economical to combine the ring control feature with the ring-down trunk circuit.

Intertoll through-selectors: Provisions for extending intertoll calls to other toll circuits (not tributary circuits) are occasionally required in toll centers for regular or emergency switching. Through-selectors connected to level 0 of the intertoll first selectors are installed for through-switching when required. One-digit selectors, digit-absorbing selectors or two-digit selectors are available for this switching function. Through-switching codes start with 0 and must not exceed three digits. When access is required to ring-down toll circuits, these selectors are preceded by a ring control relay group.

In summary, the minimum requirements for intertoll service at a toll center include the provision of trunk circuits, intertoll first selectors, auxiliary first selectors and trunks to inward, Tx and information operators. In larger offices, auxiliary second selectors and through-selectors may also be needed. In exchanges without a toll train, toll intermediate selectors and toll connectors should be furnished for intertoll service.

Today's Best Bargain | TELEPHONE SERVICE

THE OTHER day we went back to our old Alma Mater for our 28th high school reunion. We were the class of 1920. It just doesn't seem possible that that many years have rolled around. Some of the boys have sons or daughters in high school themselves now. One of the fellows summed up the general reaction as he rubbed his hand ruefully over what used to be a crew haircut but now looks like the side of a boat.

"Just think, fellows, the boys in school today look at us the same way we looked at the class of 1892 when we were here—a bunch of fogeys!"

Speaking of those days really got the reminiscing off to a good start—the football heroes, dates, the exams we crammed for and long since forgot.

Sooner or later the conversation got around to our present jobs. When the gang found that I was from the telephone company, one said, "How is it you people are able to keep your rates so low? Why I remember when I paid Dad's telephone bill for him, it was about the same as mine is today. A local call from a pay telephone cost a nickel and it costs a nickel today. One Christmas day I called my brother's family in San Francisco—that was quite an event in our family—and I think it cost me more than $15.00. That call would be a lot less today, wouldn't it?"

"Sure," I said, "That call from Philadelphia would only cost $2.50 plus tax. Why, you know that you get more service for your money today, for local rates, are less than they were in 1920, and toll and long distance rates are more than 25% less? The answer to your question as to how we've been able to do it lies in constantly improved operating methods, labor-saving devices, and technological developments which make it possible to provide better and less costly service.

"Well," said another chap, "all other businesses I know of—autos, electrical appliances, clothing—are experiencing increasing costs of labor and materials. Their managements are trying desperately to hold the line on prices but some of these higher costs must be passed along to the customers. Aren't your expenses up over previous years?"

"You bet they are. We're paying the largest wage bill in our history and costs of poles, cable, desks, trucks and other equipment we buy are up as much as 100% over 1940."

"The bright spot in this to me," spoke up another alumnus, "is that despite rising costs, most businesses, with faith in the future, are going all out to improve their products and expand their business Your telephone company is constantly expanding its facilities, with new dial offices and additions to others, and pioneering in the fields of radiotelephone and television facilities. Automobile firms are retooling for new stream-lined models, electrical companies are constantly improving their appliances and entering new fields such as television."

"We're quite proud," I answered, "of our part in helping provide better living for more people and we realize that giving service to as many people as possible helps to accomplish this. Frankly, we like everyone else are concerned with current financial trends. For almost a quarter of a century we have improved our service, paid reasonable dividends to the owners of the business and wages to the employees comparable to what others pay without an increase in rates—in fact rates were reduced. Now, with the cost of everything that goes into the telephone business going up, our earnings are on the downgrade, as might be expected when you put in new plant with 1948 dollars, at telephone rates that are below the 1920 levels."

We had a grand time that day, chewing the fat with fellows we hadn't seen in years. Telephone service a bargain in the old days? Sure—but it's a super-bargain today for today's best buy is a telephone call.—(Courtesy, The Telephone News, published by Bell Telephone Co., of Pennsylvania.)

Intercept Service

WITH DIRECT dialing by distant operators and elimination of inward operators on most inward toll calls, good intercepting facilities are important to give the calling outward toll operators correct information on calls to changed, unassigned or discontinued numbers, and to prevent unproductive use of toll

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circuit facilities. Intercept equipment should be provided in all toll center exchanges. If it is now available, only very slight modifications are required for intertoll service.

Intertoll transmission selectors automatically apply a special tone when a call is answered by an intercepting operator. This tone identifies the call to the answering operator as a toll call. The intercept operator can remove the tone and signal the distant operator by a flashing key. This operation prevents false answer supervision, and causes the originating toll operator to respond to the special flashing signal.

Intercepted intertoll calls should not (and normally cannot) be extended by the intercept operator. The intercept trunks lack the proper supervisory features, and are not provided in sufficient quantities to handle regular traffic.

Intercepting equipment can be furnished for all types of lines. It is simple and inexpensive for individual lines and for party lines served on a terminal-per-station basis. With terminal-per-line party lines, cost of intercept equipment frequently limits application of intercept service on as broad a basis as is desirable for intertoll operation.

Unattended Automatic Exchanges

INTERTOLL calls to unattended automatic exchanges (dial tributaries) are automatically switched through the toll center via auxiliary toll selectors, and are usually completed over the same toll circuits that are used by toll center operators. Accordingly, no additional toll circuits or switches are required.

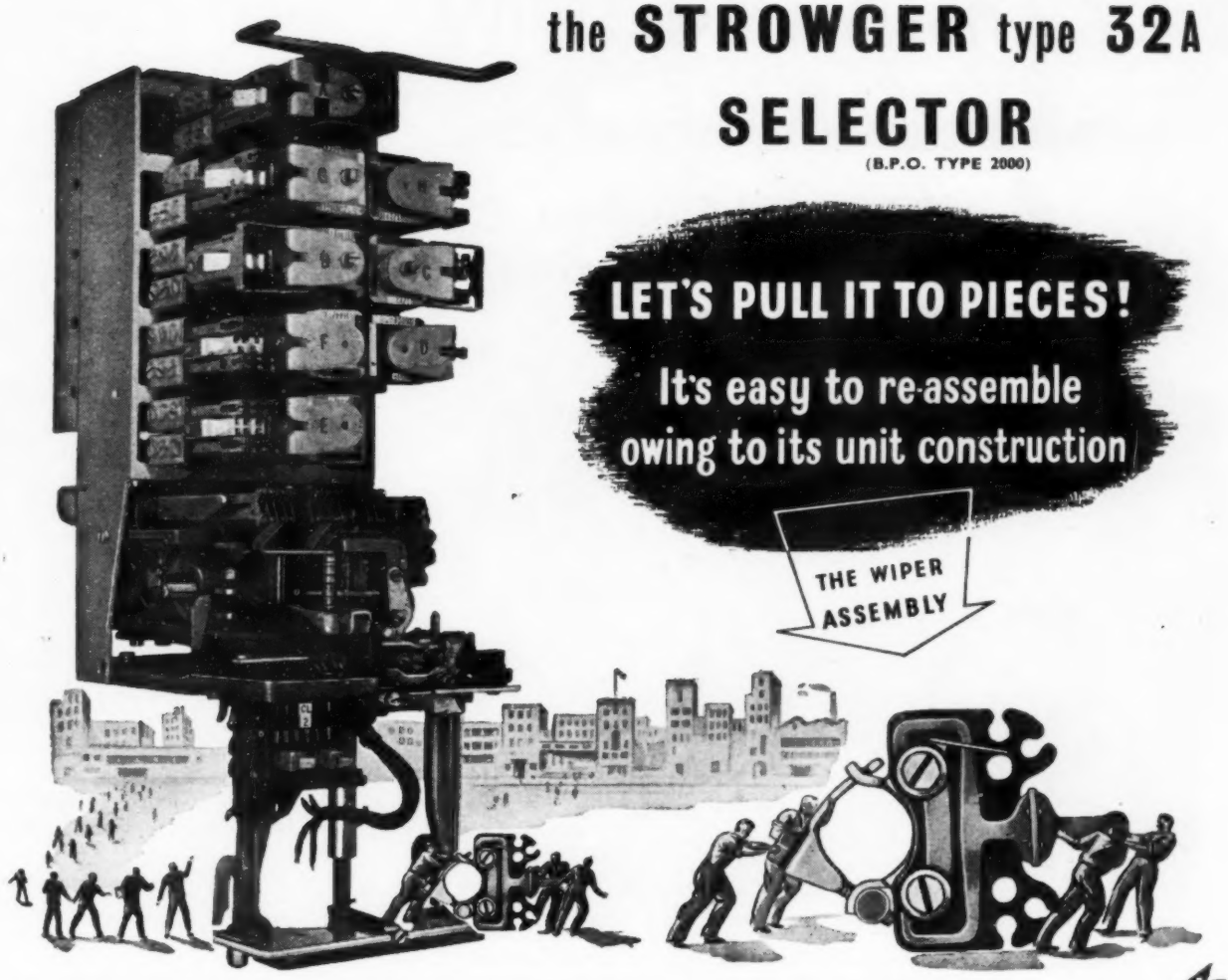
Termination of toll circuits on incoming selectors or connectors is desirable so that the toll operators will have traffic facilities that cannot be blocked by local calls. However, in the smallest Community Automatic Exchanges such facilities are sometimes considered too expensive, and not feasible because of switchboard space limitations.

When toll trunks terminate on line circuits, a "stop-dial" signal must be given to intertoll operators until the call is extended through a line-finder to a selector or connector.

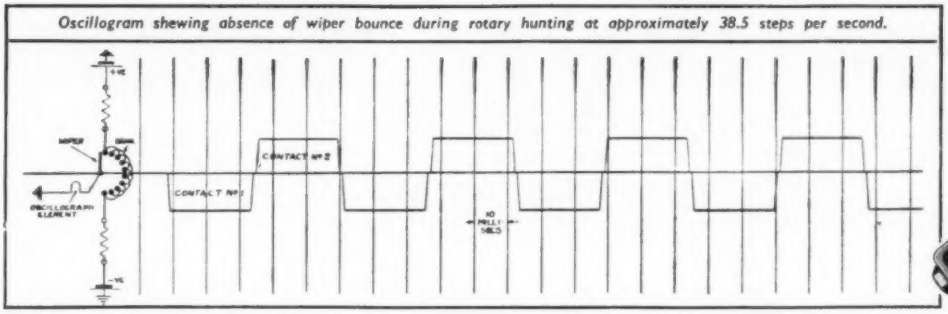
Hookswitch supervision is always provided in automatic exchanges. Visual busy signals are also essential for intertoll service. For this purpose a regular toll train (toll selectors and toll connectors) can be furnished to provide all toll facilities (flash busy, intercept tone, toll grade

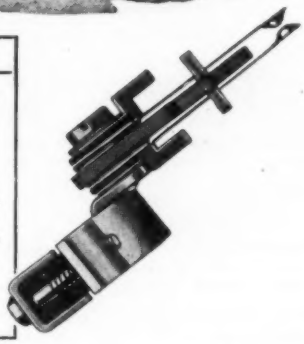
the STROWGER type 32A SELECTOR

(B.P.O. TYPE 2000)



Oscillogram shewing absence of wiper bounce during rotary hunting at approximately 38.5 steps per second.





This is another example of the skilful design which makes the Strowger type 32A selector pre-eminent.

Although the wiper is so small a unit a great deal of research and development work has gone into the making of it. This is not surprising when one considers the very exacting nature of the work the wiper has to perform.

Telephone engineers will appreciate that correct pressure on the bank contact is essential and in the present design this is achieved by adjusting the tip gap only. A fibre collar links the two blades together so that they float up and down as a pair, thereby equalising the pressure on upper and lower tips. This collar also eliminates bounce during rotation of the selector as is shown on the typical oscillogram reproduced above.

Another important feature is the amount of vertical flexibility which results from the design of the wiper. Variation of contact pressure is therefore slight with inaccuracies of alignment to the contact bank levels. Excessive vibration of the tips during vertical stepping is checked by the rigid central insulator; consequently, very little pause is needed between the vertical and rotary actions.

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New CHANCE 8-way Expanding Anchor

Another contribution to better anchoring

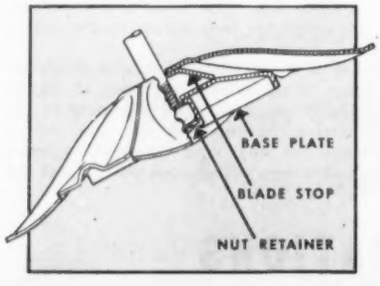
Here is another answer to the problem of rapidly rising line construction costs! The new Chance 8-way Expanding Anchor gives you more holding power for less money.

Better load distribution makes this new Chance Anchor stronger than other expanding anchors—and the absolute simplicity of its construction makes it the most smoothly operating expanding anchor on the market.

GREATER HOLDING AREA. Eight blades expand to form a square, with equalized load distribution all around the anchor. Each blade carries approximately one eighth of the load. There are no open areas between blades.

GREATER HOLDING POWER. The 8-way Anchor expands in the shape of a cone and holds like a wedge against undisturbed earth on all sides.

SIMPLE CONSTRUCTION. No moving parts, arms, or mechanical devices hinder the smooth operation of the 8-way anchor.



STURDILY BUILT. Each blade is formed with a reinforcing rib that prevents buckling. Hinges will not collapse under strain.

RETAINS SHAPE UNDER HEAVY LOAD. Repeated pull out tests show that the new 8-way Anchor develops more holding power under the same conditions than other expanding anchors of comparable size.

EASY, SURE EXPANSION. The pre-formed blades cut into solid earth with little disturbance and the pointed corner blades make starting easy. Linemen can tell when the anchor is fully expanded by the sound of the top plate hitting the bell-shaped blade stop.

BLADES ARE SUPPORTED BY BASE PLATE. They will not buckle down in the middle. The diagram, showing expanded position, illustrates how base plate supports blades.

NUT RETAINER, shown in diagram, makes it easy to push anchor to bottom of hole. The anchor rod and nut cannot be pulled through the base plate.

C4818

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battery), or, regular selectors and connectors can be designed to give visual busy supervision on toll calls, and audible busy on local calls. The arrangement may be called a simplified toll train.

Intercept service is recommended for unattended exchanges having more than 500 lines. When provided, intercept features should be the same as in toll centers. The intercept operator will usually be located at the toll center, and intercepted calls will be extended to her over special trunks or regular service trunks.

Present Intertoll Dialing

AUTOMATIC Electric Company has pioneered toll dialing with the cooperation of Independent operating companies for over thirty years. Intertoll dialing along the lines described in this article but not on a nationwide basis has been in operation between Bell and Independent exchanges in several areas, notably in Ohio, for the last ten years, with much of the equipment supplied by Independent manufacturers. As a result, nationwide operator toll dialing does not present new and unsolved problems.

Long experience and actual field-tested equipment facilities provide an adequate background for meeting intertoll dialing requirements in new or existing exchanges in the most appropriate and economical way.—

NSRB Communications Div'n Forming Advisory Board

Progress made in establishment of communications-electronic manufacturing industry advisory committees to Munitions Board and National Security Resources Board has resulted in Munitions Board chairman Hargrave approving the dispatching of invitations to the membership of the projected Electronics-Radio Industry Advisory Committee. NSRB Communications Division also is preparing a list of logical appointments to a joint wire communications industry advisory board on the production and procurement problems of wire telephone and telegraph manufacturers.

With the aim of preparing the foundation for any possible national emergency, there is under study the idea of a communications operating (telephone and telegraph) industry advisory committee which would work with the Joint Communications Board in addition to these two other agencies on the communications facilities requirements for the armed services.

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Overhauling Outside Plant in Automatic Conversion Programs

(Continued from page 45)

trouble. Time and skill is required to properly make a wire tie of this kind. Figure 15 illustrates the versatile use of the drop wire clamp in various types of attachment.

Drop wire clips are used in pole-to-pole spans instead of drop wire clamps.

Drop wire that is in fairly good shape, except for a bad spot or two, may be repaired with advantage. Usually such damage is caused at points of support on a terminal pole or cable messenger, either as the result of too short a loop between two clamps, causing the clamp edge to wear into the insulation, or to squirrels gnawing the insulation. It is often possible to repair such damage as a squirrel gnawed loop on drop wire by wrapping with friction tape between the drop clamps.

Broken conductors in drop wire are repaired by splicing with compression sleeves and then covering with one layer of rubber tape, followed by two layers of friction tape laid on in reverse directions.

When drop wire is too badly worn or damaged for use, it should be replaced with new wire. The newly developed neoprene and teleprene drop wires have proved highly popular for new installations or for replacement purposes. They are very easy to put on and have, so far, stood up under the most severe conditions of abrasion and exposure to the elements.

The fundamental facts concerning outside plant rehabilitation in automatic conversion program is to, first, solicit non-subscribers to make sure that circuits will be made available for all; second, plan the cable construction or rehabilitation for the town area; third, arrange for the rebuilding of the rural plant and extending present wire lines as required; and, fourth, plan the drop wire replacement and reconditioning.

A detailed description of the construction and repairing method is necessarily beyond the scope of this article. Actually, it may be considered in part a review of articles on plant construction and maintenance that appeared in previous issues of TELEPHONE ENGINEER AND MANAGEMENT and in part a preview of other features planned for future issues of the magazine.

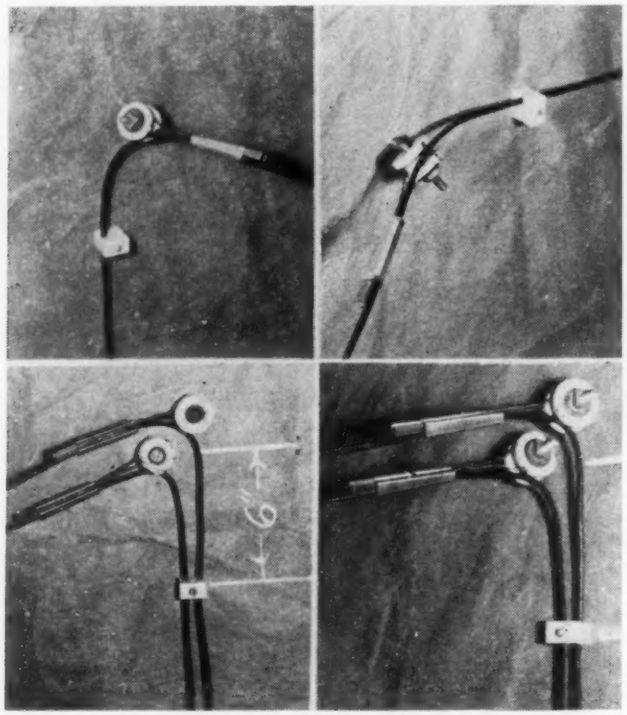

Fig. 15 — Uses of drop wire clamp in attaching drop wire to a frame house. Top left—Single drop run to angle screw and knob (vertical run). Top right—Single drop run to angle screw and knob (horizontal run). Bottom left—Two-drop run to knobs attached directly to siding (vertical run). Bottom right—Two-drop run to angle screws and knobs (vertical run).

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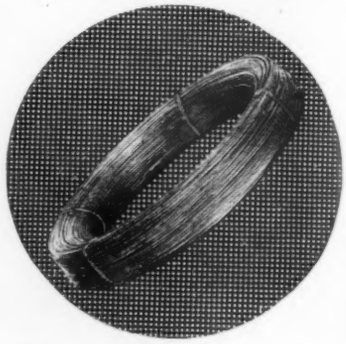

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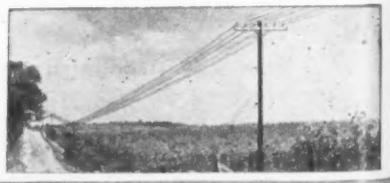

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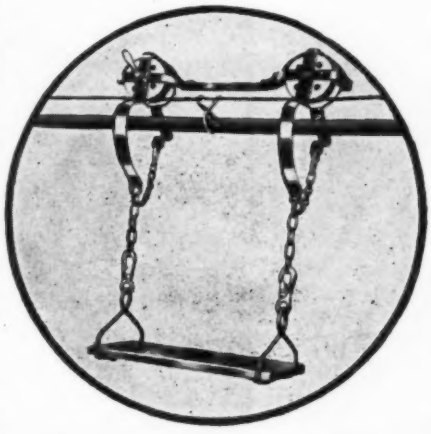

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First "Director" System In U. S. Now Serves San Fernando, Calif.

SATURDAY, July 31, marked another significant milestone in the history of Independent telephone development when the three-office San Fernando network of the California Water & Telephone Co., was converted to Strowger Automatic operation. The conversion involved three offices: the San Fernando main office, with 3200 lines; and the unattended offices at Sepulveda and Granada, with 1000 lines and 300 lines respectively.

Provides Facilities to Meet Complex Trunking Conditions

Unusual interest has been shown by both Independent and Bell telephone men in this project because it makes use, for the first time in the United States, of the Strowger "Director" System, which provides facilities for digit registration and translation to meet the complex trunking conditions encountered in large city networks and metropolitan toll areas set up on a universal numbering basis.

Installation of Director equipment in San Fernando comes about as a result of the comprehensive plans which are now being implemented to provide faster and more convenient service over the complex network of toll lines between various points in Southern California, and paves the way for ultimate subscriber dialing of such calls through the use of automatic toll ticketing equipment.

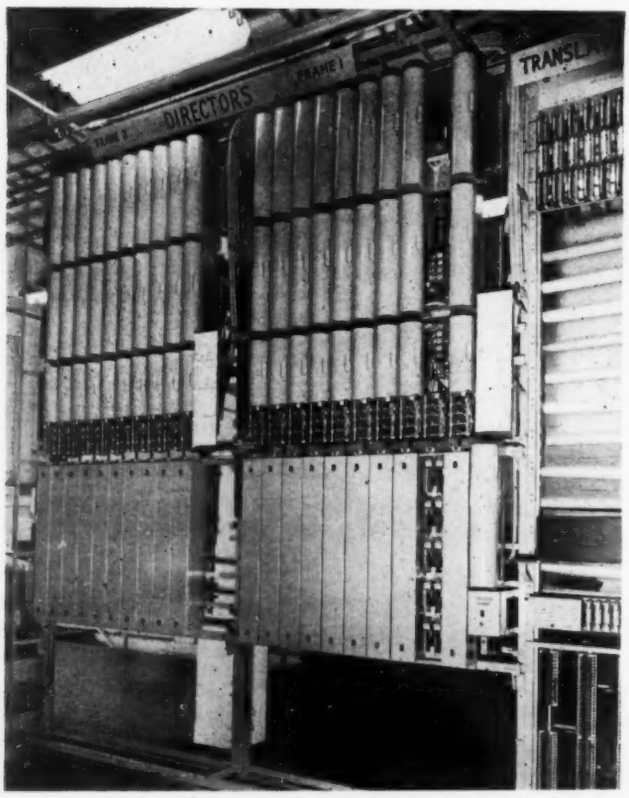
Mayor Brice Schurr of San Fernando making the first call while Bert Probasco, local manager, looks on.

Among the principal moving spirits behind these plans are C. H. Loveland, president, and A. L. Johns, vice president, of the California Water & Telephone Co., whose foresight and long range study led to this first step towards the ultimate goal. Joint studies which they have conducted with other telephone companies in the Los Angeles metropolitan area led to the adoption of the present numbering plan for that area, in which each telephone office has its own two- or three-figure office code designation, which also serves as the prefix of the seven-digit call number assigned to each local station.

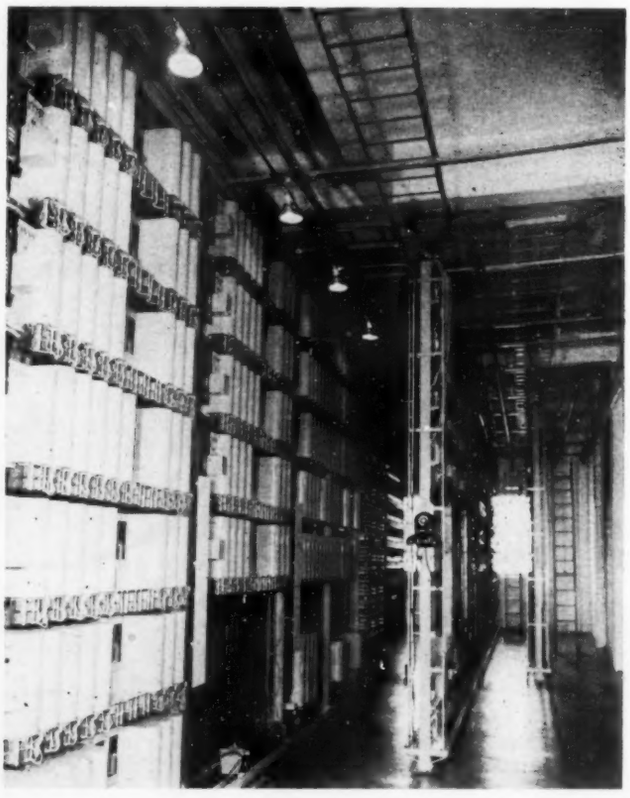
While the installation of Directors in San Fernando will not serve its full purpose until automatic toll ticketing is in effect, it is a necessary preliminary to that step, and will also enable the telephone company to meet in advance certain important requirements of the ultimate metropolitan plan.

One of these is the requirement for a universal call numbering scheme, by which is meant that the code number to be dialed to reach any given exchange must always be the same regardless of where the call originates. The Director, often referred to as the "magic brain" of the Strowger Systems, meets this condition by translating the dialed code into a "directive" which will route the connection link by link to the called exchange no matter where the call originates.

Another requirement in areas of this sort is to provide the necessary "judg-



Strowger "Director" Bays at San Fernando main office.



Selector Bays in the San Fernando main office.

ment" whereby a call is prevented from being blocked by busy trunk groups at any point along the way. This, too, is a function of the Director, which has the uncanny ability, whenever the preferred route is blocked, to try other available routes in succession, thus making the fullest possible use of the network trunking facilities.

A third requirement of the San Fernando exchange is the need for distinguishing between calls from "limited service" and "extended service" subscribers. Here again the Director takes over, and in the event of any attempt on the part of a limited service user to make an unauthorized call to an office in another exchange area, routes the connection to an operator who can "ticket" the call in the usual manner.

The Director is one of the creations of the Automatic Electric Laboratories. Though new in its application to telephone networks in this country, it has been widely and successfully used in various forms abroad. Its earliest use on a large scale was in the complex and extensive network of London, England, and it has since been used in city exchanges and toll networks in other places.

Because of the relative simplicity of such multi-office city networks as are operated by Independent telephone companies in the U. S., the Director has so far not been needed for that purpose. However, in recent years, there has been a steadily growing interest in the Director because of its adaptability to toll dialing in metropolitan-suburban areas where there is a growing concentration of traffic over networks connecting suburban exchange areas.

Many such installations, involving both Director and automatic toll ticketing applications, are now in the engineering or manufacturing stage, but the California Water & Telephone Co., may justly take pride in being the first company in the United States to make commercial use of the Director in anticipation of the time when subscriber toll dialing will be a widespread practice.

Dialing on Universal Number, Free Service Basis

Dialing between three offices in the San Fernando network is on a universal numbering, free service basis, using seven digit call numbers, the prefixes for the three offices being EMpire 1, EMpire 2, and EMpire 3. The first three digits are received by one of the Directors, and the first two digits, in the case of a local area call, are absorbed by the Director, the remainder of the digits being sent on to the switch train in the usual way.

Ultimately, the Directors will become part of the automatic toll ticketing scheme, taking over the routing calls when the time comes for subscribers to dial their own toll calls. For the present, all calls going out of the San Fernando network are handled at the sixteen position D. S. A. manual board in the main office which was placed in service at the same time as the automatic equipment.

A dinner preceding the cutover was given by the California Water and Telephone Co. at the Porter Hotel in San Fernando. Guests included prominent executives from the local telephone company and other Independent companies in the area, as well as representatives of the Pacific Telephone & Telegraph Co. Toastmaster was F. H. MacGougan, Monrovia district manager for the California Water & Telephone Co. Talks were given by C. H. Loveland, president, A. N. Johns, vice president, and Charles Austin, vice president, of the telephone company, and by C. S. Cadwell, president of Automatic Electric Co., and J. A. Rector of the Los Angeles office of Automatic Electric Sales Corp.

At the conclusion of the dinner, the guests were invited to inspect the new building and equipment, and the mechanics of the cutover proceded shortly afterwards. Mayor Brice Schurr of San Fernando made the first call over the system to the Los Angeles Fire Department.

Installation of the central office equipment, which was successfully handled by personnel of the California Water & Telephone Company, was a remarkable achievement from many standpoints. Except for Tom Walsh, the company's installation superintendent, most of the installation personnel were inexperienced; the installation schedule was very closely figured; and of course, the techniques of Director installation and testing were also new. Despite these obstacles, the cutover proceeded smoothly and the subsequent successful operation of the equipment proved gratifying both to the telephone company and to the public.

Automatic Electric Company's engineering organization was represented by K. W. Graybill, chief engineer, and J. E. Ostline, project engineer, who has been intimately associated with the development and application of the Director service since its first use in London, where for several years he was resident engineer. The company's operating department was represented by E. L. Schwartz.

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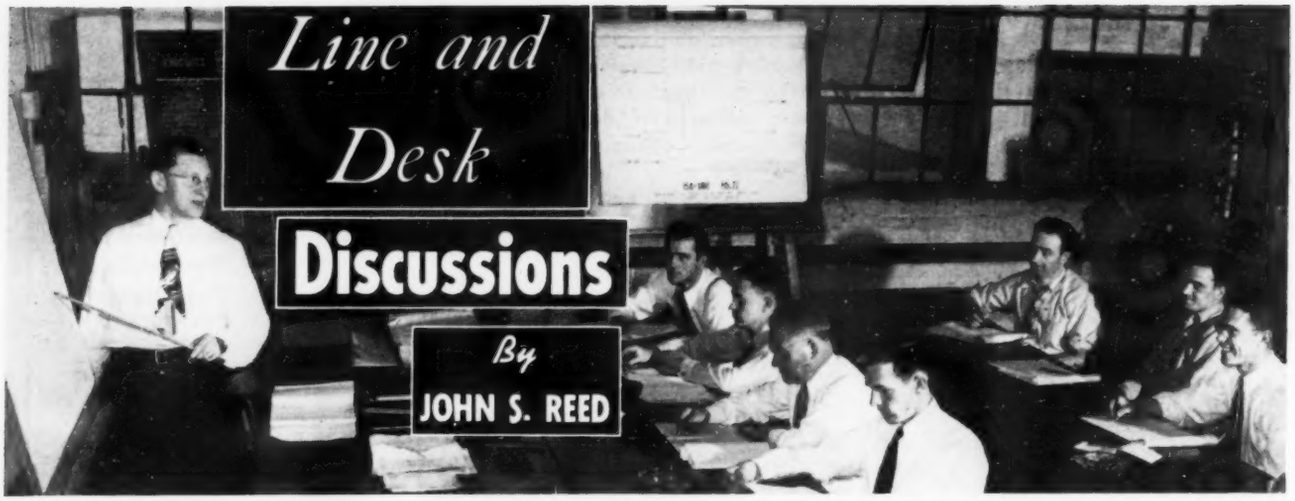

Line and Desk Discussions

By JOHN S. REED

Dry Cell Tester . . .

Q. How would you convert a voltmeter for use as a dry cell tester?

A. If you have a 1½-volt voltmeter (with scale reading 0 to 1.5 volts), connect a 6.66 ohm resistor in shunt across the meter terminals and equip the meter with test leads and clips. To use this meter, connect the test leads to the terminals of a single dry cell and leave them connected for one minute. If the voltage drops to 0.93 volt or less at the end of this period, the cell is worn out. Note: If you desire to use a 3-volt voltmeter (0-3-volt scale), for two dry cells in series, connect a 13.3 ohm resistor across the meter terminals. The cut-off voltage in this case would be 1.86 volts instead of 0.93 volt at the end of one minute.

Wire Crossing At Transpositions . . .

Q. Is it necessary for line wires to cross over and under at a transposition point, and does it make any difference whether a left-over-right or a right-over-left arrangement is used?

A. In standard transposition procedures, it is customary for the wires to cross left over right at the transposition point. In phantom arrangements, the left pair of wires cross over the right pair at the phantom transposition points. This results in a rolling transposition in which one wire or pair spirals around the other at the cross over points. With point type transposition, however, the wires do not spiral over each other but move from front to back and vice-versa at the cross over points (looking towards the line from the roadside.) Both kinds of transpositions are equally effective when the spacing transposition poles is in the order of one-quarter mile.

JOHN S. REED

For very short spacings between transposition poles, the point transposition method is more suitable and is more likely to result in effective suppression of noise induction and crosstalk, particularly when telephone carrier circuits are involved.

Gas Pressure Testing . . .

Q. In gas pressure testing, can we use ordinary soap flakes for making the soap solution for applying to the cable sheath to locate leaks?

A. Soap solutions made from flake soap seem to work all right, but we believe that the special liquid soap preparation that is obtainable from telephone jobbers is better for the purpose. Such liquid soap contains glycerine which make better and longer lasting bubbles and is not so likely to freeze. In very cold weather, more glycerine can be added to the solution to lower its freezing point further. Warming it before use will also help it to retain its liquid consistency.

Extraordinary Repairs . . .

(Q.) What are considered extraordinary repairs to a telephone plant?

(A.) Extraordinary repairs to telephone plant such as extensive damage by storms or arrangements necessitated by public requirements may be handled as a special deferred charge, if substantial, rather than as a charge against the depreciation reserve account. This treatment is usually followed only when the total charges are so excessive that it would result in an undue depletion of the depreciation reserve.

Transpositions . . .

Q. How is it possible to make transpositions in the mid section of a river crossing wire span? We have thought of using strand insulators to separate the two ends of the line wires at this point and employing heavy copper wire bridges at the insulators to connect the line wires together in a transposition. Would that work?

A. The method you have outlined has been used with good results in the past, but is quite awkward. There is, however, now available a special fixture that can be used for the same purpose with much greater ease. This is the Case span transposition bracket which can be placed on the pair of wires to be transposed without cutting the wires.

Gas-Filled Cable . . .

Q. When is the use of gas-filled cable justified?

A. Gas-filled cable maintained at a definite pressure is very expensive to install, though its use does reduce maintenance costs considerably. Such cable is best suited for long lengths of

high grade toll cable where a failure would be very serious.

Trouble Abbreviations . . .

Q. What are suitable abbreviations for recording trouble reported to the operator or to the testboard?

A. We have compiled in Table I a rather complete list of trouble abbreviations used in a large dial exchange. These trouble abbreviations vary more or less in different companies, however.

Cable Dessicant . . .

Q. Is it all right to use cable desiccant in old cable splices?

A. Cable desiccant may be used whenever a cable splice is opened. If the splice, however, has been previously boiled out with paraffin or paraffin-splicing oil mixture, it is desirable to continue using this method unless conditions are unfavorable to its use. In any event, it will be necessary to boil out the splice before any repair work can be done, in order to loosen the cable conductors for the work. On completion of the job, desiccant should be worked into the core of the splice before wrapping the latter with muslin and replacing the sleeve. Sometimes the dry muslin will interfere with replacing the sleeve. In such cases, rubbing the outside of the muslin wrapping with paraffin or the oil mixture will provide the necessary lubrication for sliding the sleeve into position over the splice. When reopening a splice already containing desiccant, the old desiccant should be brushed out of the core and fresh desiccant employed.

Cable Splice Insulation . . .

Q. I have been told that the ordinary scotch cellophane tape can be used for insulation splices in cable conductor splices. What is your opinion of this idea?

A. We would not recommend the use of the cellophane tape for insulating cable conductor splices. While the insulating quality of this tape would appear to be satisfactory for this purpose, we have heard of cases of splicers who tried this method, only to discover that the wire splices gradually penetrated the cellophane and caused shorts and crosses to develop. Until manufacturers have developed a better product for insulating conductor splices, you should stick to the use of standard impregnated cotton sleeves for cable splicing work. It is permissible however, to use scotch **electric** tape for covering breaks in the paper insulation not involving splices.

TABLE ONE—Complete List of Trouble Abbreviations Used In a Large Automatic Exchange

Ards—Automatic ring does not stop
Bdr—Bells do not ring
Br—Bells tingle or tap
Brna—Bells ring, no answer
Brwd—Bells ring or tingle while dialing
Brwpty—Bells ring with party
By—Busy
Ca—Cannot answer
Cbc—Cannot be called
Cbh—Cannot be heard
Cc—Cannot call
Cfwn—Called for wrong number
Ch—Cannot hear
Char—Cannot hear audible ring
Co—Cuts off
Cr—Cannot raise party
Da—Does not answer
Dtds—Dial tone does not stop
Fades—Dies out
Gd—Goes dead
Gwns—Gets wrong numbers
Ncr—No coin return
Ndt—No dial tone
Nr—No ringing tone
Nsy—Noisy
Od—Out of order
On—Off normal
Pg—Permanent ground
Pt—Poor transmission
Riob—Rings in over busy, while dialing
Wn—Wrong number
Xed—Cross talk or crossed lines.
Adj. bells ldr—Adjust bells louder
Adj. bells lwr—Adjust bells lower
Base bro—Handset base broken
Bell box loose—Bell box loose
Bzr od—Buzzer out of order
Cd worn—Cord worn
Dial stix—Dial sticks
Hp. bro—Handpiece broken
Mpc. bro—Mouthpiece broken
Plunger stix—Handset plunger sticks
Pole bro—Pole broken
Rec bro—Receiver broken
Rec hook bent—Receiver hook bent
Rec hook catches—Receiver hook catches
Tel loose on wall—Telephone loose on wall
Wiring loose—Wiring loose
Wire bro—Drop or line wire down

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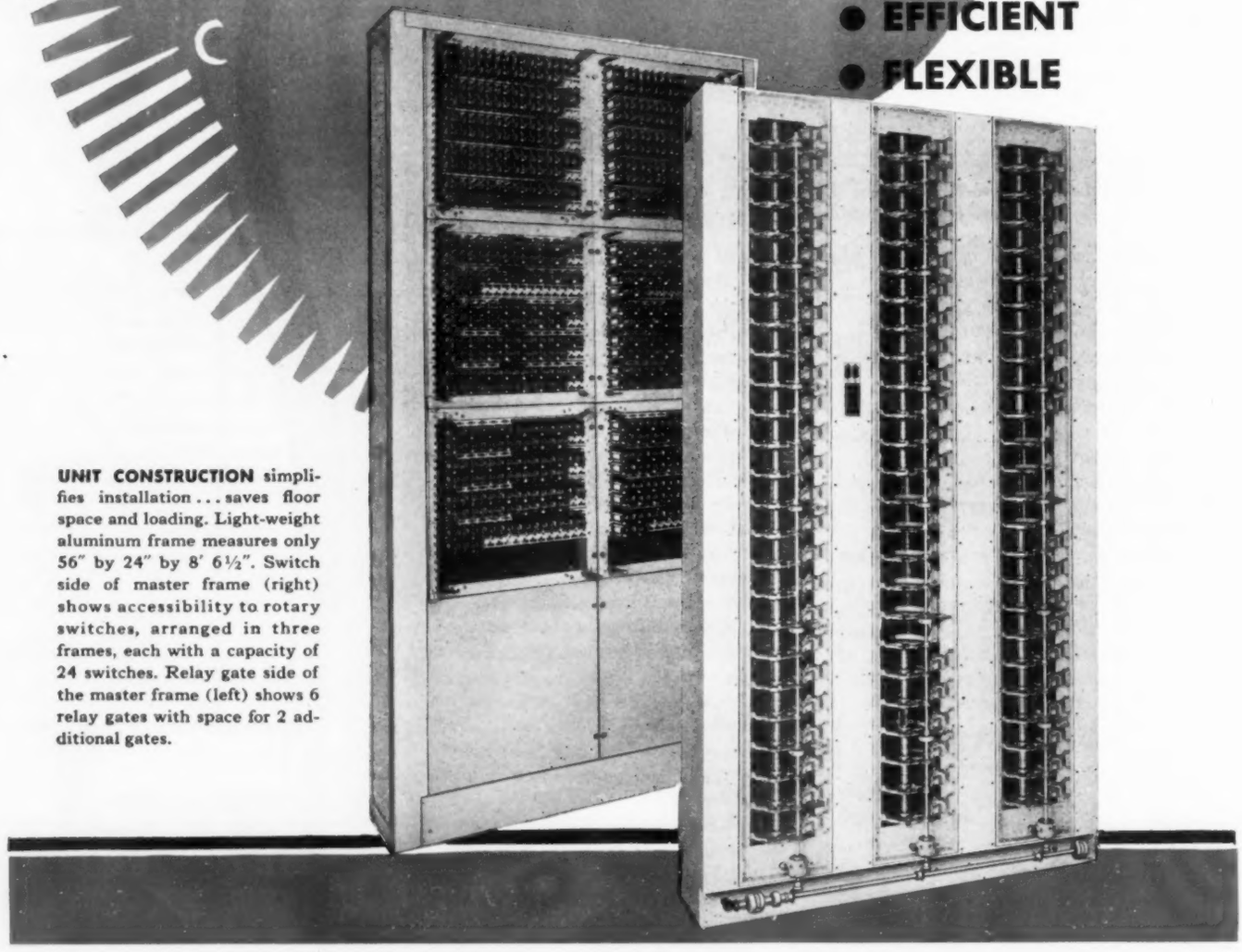

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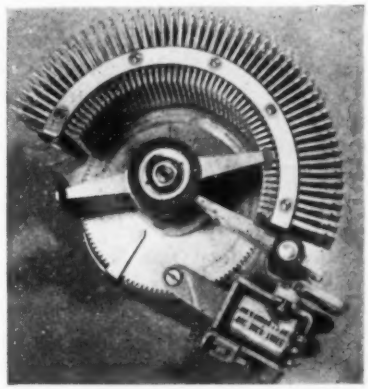

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Winterizing The Outside Plant

(Continued from page 40)

almost universal use of compression sleeves for line wire splicing recommends this method against other types.

Line Wire Splicing

If there is any company that is still using hand splices the writer thinks they should be awarded the prize for being the last to "throw the old aside." The use of compression sleeves is now standard practice with all of the larger companies. Compression type splices insure good low resistance, strong mechanical connections, and they are very easy to apply. Compression sleeves are available in several different types such as: the standard line sleeve, the reducing sleeve (changing from one wire size to another size), the offset sleeve for dead ends, long splicing sleeves for repair splices, and small sleeves for drop and inside wire.

Drop Wire Construction

The essential requirements for good drop wire construction are: (1) Locate drop runs so the drops do not come in contact with trees or buildings; (2) use dead end and intermediate ties or clamps which will not damage the drop wire insulation, and (3) avoid drop wire spans of excessive length.

Drop wire is very perishable and will have relatively short life when run through trees. If it is impossible to avoid a tree a hole should be cut through it and the drop mechanically protected with a loom or plastic guard.

The choice of twisted pair drop versus the parallel type is largely a matter of personal preference. In the writer's opinion parallel wire has certain advantages and should be used, particularly now that it is available in the new long wearing plastic type. Drop wire is now available in either number 17 to 18 gauge. It is only in recent years that 18 gauge drop wire has been used, but some of the large operating companies have now standardized on it. Drop wire clamps and clips have largely replaced hand ties. They save labor and if properly used do an excellent

The point of attachment to the subscriber's building as well as any horizontal or vertical wiring runs should be securely and neatly made using standard fixtures. A common source of transmission trouble is the connection between the rural subscriber's drop and the line wire. Where drops are connected to open line wire it is absolutely essential that the connection either be soldered, made with a compression sleeve, or a test connector used. It is simply impossible to get a good "long term" connection by simply wrapping the skinned drop wire around the line wire. Drop wire should be given an adequate amount of sag as otherwise it will have a much greater tendency to break when heavily loaded with ice or snow.

Subscriber Station Inspection

If manpower and time permits it is desirable that all rural stations be inspected before winter. These annual "once over lightly" inspections are not as burdensome as one might think. They pay for themselves in the form of better service and greater freedom from long trips over bad roads during the winter months. Inspection of the subscriber's installation should include the following:

(1) Check the connections to the ground rod and the wiring run from ground to arrester.

(2) Check carbon blocks in arrester and connections at arrester.

(3) Note condition of wiring run between arrester and telephone and staple securely in place.

(4) Check drycells (in magneto set) and replace if they show less than 0.93 volts per cell when discharged into approximately 6.66 ohms.

(5) Burnish switch hook contacts and adjust.

(6) Oil generator and screw down if loose on base.

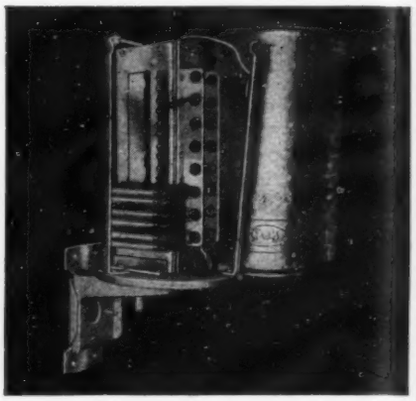
(7) Test transmission of instrument by shorting terminals and noting side tone.

(8) Replace receiver diaphram if bent or rusty.

(9) Replace receiver cord if badly frayed or shows tendency to cut out.

STROMBERG-

cook type S-20
pole cable terminal



Can be used as a protected or unprotected terminal. Made in 6, 11, 16, or 26 pair capacity.

Cook Type S-20 Pole Cable Terminals are carefully engineered to offer the user:

MAXIMUM ECONOMY—because Cook Type H 20 Protector Units, containing fuses and primary and secondary lightning arresters, are added only as they are required.

MAXIMUM CONVENIENCE for installation and servicing. Drop wire connections are at front. Drops are led through individual insulating knockout holes. Self-soldering nozzle lies close to pole. Hood locks in raised position for working. Separate mounting bracket eliminates gaining of pole and provides easy installation.

MAXIMUM PERFORMANCE when used separately or as part of the Cook Trans-Mount System of Protection and Distribution. S-20 is of all steel construction, hot galvanized. Complete terminal designed for maximum insulation.

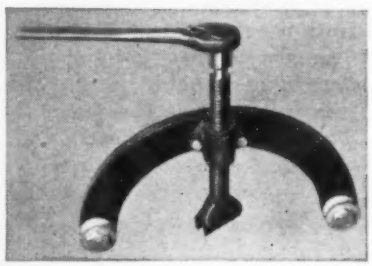
STROMBERG-

BRANCH OFFICES: CHICAGO

ERG-CARLSON Recommends

ratchet handle slack puller

made by Cable Spinning Equipment Co.



The same dependable Slack Puller, but with a ratchet added. This type of handle enables the operator to pull slack with the Little Giant Slack Puller, requiring even less effort than would be needed with the conventional model.

The correct tool for those who use the Puller day after day.

for durability

manufactured by Colfax Lumber & Creosoting Co., Inc.

DIAMOND C POLES

For the greatest durability in poles, use COLFAX Creosoted Yellow Pine Poles.

The poles are treated full length under pressure with the finest and cleanest obtainable grade No. 1 Creosote Oil, a pure distillate of coal tar, in accordance with AWPA standards.

Each pole, after being carefully graded according to the physical specifications, is treated with eight pounds of creosote, or more if the customer desires.

COLFAX Creosoted Yellow Pine Poles will assure you the lowest annual pole cost obtainable.

For durability, use DIAMOND C

Creosoted Yellow Pine Poles

long life telephone dry cells

"Eveready" "Columbia" "Gray Label"

• Higher sustained voltage • Longer life • Rock-bottom economy.

These qualities, more important now than ever before, are assured through the constant supervision of America's largest dry battery laboratory.

Made by the makers of "Eveready," "Air Cell" Operators' Transmitter Batteries.

The quality cell preferred by telephone engineers

ERG-CARLSON FACTORY, GENERAL OFFICES: ROCHESTER 3, N. Y.

CHICAGO · KANSAS CITY 8. SAN FRANCISCO 3. IN CANADA: STROMBERG-CARLSON COMPANY LTD. TORONTO

STROMBERG Telephone CARLSON

Washington Bureau Reports

(Continued from page 31)

subscriber must pay them before he has the necessary facilities to make an interstate call, then "by the same tokens (the FCC) has jurisdiction to regulate (exchange rates) and the state commissions do not." This position was actually taken by a retired Maryland attorney who intervened as a subscriber in the Maryland intrastate rate case and later took the matter to court.

A three-judge Federal District Court rejected this contention, Mr. Quisenberry recalled, with the conclusion that "it is perfectly clear that the Public Service Commission of Maryland has the right to fix intrastate rates, as everybody agrees, and that it did not lose that power, because under the very common practice, the telephone instruments that are used in connection with the local exchanges are also used in interstate communication. Certainly we think that it in no way marches against our conclusion that the ordinary user of a telephone who wants to make a long distance call must use the instrument in his own house or business place, for which he pays a local exchange rate. That is such a practicable and utterly convenient and reasonable arrangement that we cannot imagine that any court would say that that converted what is essentially an intrastate charge into a regulation of or interference with interstate commerce."

"Cornerstone" Rate Decision

THE COMPLETE denial of any rate increase by the Southern Bell Telephone & Telegraph Co. in Tennessee, the first such decision in the postwar series of Bell System rate cases, ,which has been regarded as a "cornerstone" finding by opponents of rate increases to meet present inflationary conditions, has had a second substantial chunk taken out of it by a court.

Upholding fully the decision of a Nashville chancery court that the decision was unconstitutional and results in confiscation of Southern Bell property, the Middle Tennessee Court of Appeals has granted the company an injunction to put its full proposed rate schedule in effect under bond.

The Tennessee tribunal became another in the long series of courts to recognize the principle of interim increases under bond, thus protecting the company against continuing losses while permanent rates are being considered and protecting the public against paying rates higher than those which may be ordered.

The next step in the court review of the Tennessee decision will be the appellate court's consideration of an appeal by the commission to the chancellor's decision setting aside the regulatory agency's decision. The case was brought to the court of appeals in two parts, with the request for emergency relief coming first.

The Tennessee commission, in rejecting entirely the rate boost plea, arbitrarily reduced actual operating expenses of Southern Bell in the state and then forecast that the company's position would improve as the number of subscribers increased. Actually, Southern Bell brought out in the court case that while its losses were running about $3500 daily when the commission hearings were held, they have now gone up to more than $5000 a day.

Coming Conventions

Rocky Mountain Telephone Association, Albany Hotel, Denver, September 16-17.

Michigan Independent Telephone Association, Hotel Olds, Lansing, September 23-24.

United States Independent Telephone Association, Stevens Hotel, Chicago, October 11, 12, 13.

South Dakota Telephone Association, Cataract Hotel, Sioux Falls, October 20-21.

The North Carolina Independent Telephone Association, Grove Park Inn, Asheville, October 25 and 26.

South Carolina Independent Telephone Association, Wade Hampton Hotel, Columbia, October 28-29.

Florida Telephone Association, Orange Blossom Hotel, Sarasota, November 8-9.

Virginia Independent Telephone Association, Roanoke Hotel, Roanoke, November 11-12.

Missouri Telephone Association, Governor Hotel, Jefferson City, November 15-16.

Alabama Telephone Association, Jefferson Davis Hotel, Montgomery, November 18-19.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, November 18-19.

Georgia Telephone Association, Henry Grady Hotel, Atlanta, November 22 and 23.

Phonevision Position Made Clear

AS TELEVISION service continues to spread, with a likelihood that in a few years every community of any size will have primary service, a recent letter of the Bell System companies to the Zenith Radio Corp. on "phonevision" is of significance to all telephone companies.

J. J. Hanselman, Assistant Vice President of the American Telephone & Telegraph Co., wrote: "The position of the Bell Telephone Companies with regard to phonevision is as follows: We, of course, do not know whether your contemplated technique for utilizing telephone facilities to transmit signals to the individual television receivers could be used without impairing normal telephone service. There have been no specific proposals or telephone company tests with regard to this question.

"As you will recall, when you told us of your ideas for a fee type of television service last year, we stated that the Bell Telephone Companies are always receptive to suggestions of new uses to which their plant may be put, provided they do not interfere with the primary undertaking of furnishing telephone service. In my letter to you of May 15, 1947, I said 'I should think the telephone companies would wish to study the proposal and consider its use at such time as a specific arrangement is suggested.' We subsequently offered in my letter of June 16, 1947, to conduct tests over telephone company lines when your development reached the stage to make this desirable. While one of our people viewed a preliminary model of your set, we have not been advised that your development has been completed . . .

"As also stated in my letter of May 15, 1947, the telephone companies do not feel that it would be appropriate for them to sponsor or undertake phonevision. Presumably then if phone vision is to be provided it will have to be sponsored and organized by some other group such as television broadcasters or program producers. Up to the present, we have received no requests for facilities from any such group. We therefore have no way of knowing whether the principals in any contemplated phonevision enterprise would simply request circuits from the telephone company or would ask them to switch the signals in response to calls from owners of receivers."—THE END

The Markets For New Capital

(Continued from page 35)

lion, but of 3.25% 1971 at 100, yield 3.25%. No other of the independent telephone companies has made repeat issues of bonds during the period, but many electric utilities have done so. Arkansas Power & Light, for example, in July 1947 sold $11 million 2.875% 1977 at 101.80, yield 2.79%, and in August 1948 $7 million of 3.125% 1978 at 101.07 to yield 3.07. Many similar examples could be given.

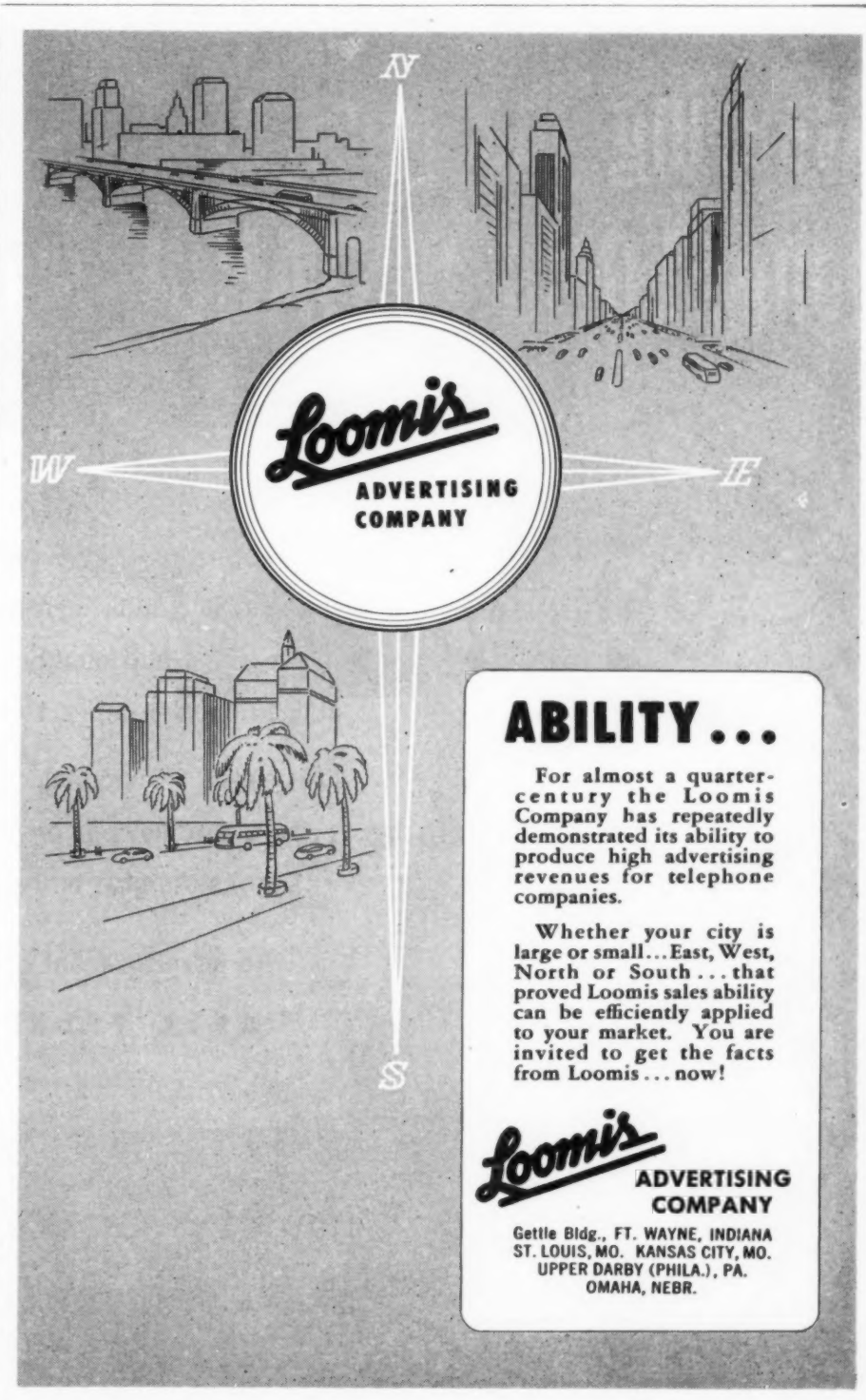
The downtrend in telephone company bond prices, of course, has been under way since the middle of 1946. Back in January 1941 Illinois Bell Telephone sold $46,250,000 1st 2.75% 1981 at 103½, a yield of 2.60%. In early 1946 they sold on the New York Stock Exchange as high as 108.625, their low for the year was 102; even in early 1947 they sold at 105.375 but before the end of the year were at 94.25. They are now at 95.25, yield 2.95%. American Telephone in July 1946 sold $125 million of 2.625% 1985 at the price of 100.85 to yield 2.60%; the highest they sold this year was 93.75, then down to 85.75, and are now at 89.25 to yield 3.10%. In fact all of American Telephone debentures are now selling five to six points under their original offering price except Company's two convertible issues.

Many of the recent long term bond offerings have not made a successful debut. New Jersey Bell Telephone in July offered at competitive bidding $55 million of 40-year debentures, and received two bids. The winning group bought the debentures at 102.60 for a 3.125% coupon, and at once put them on the market at 103.125 to yield about 2.99%. This was a higher yield than other recent Bell system bonds had given, and the New Jersey debentures represented company's only long term debt. But they were not eligible for purchase by life insurance companies of New York state, inasmuch as company's income in the preceding year, 1947, would not have covered the interest charges on the new issue one and one-half times. Lacking support from that quarter the bonds went very slowly, the syndicate was held open a full month, and when it was closed August 12th the new bonds sold down in the over-the-counter market to 101 bid. Latest quotation for them is 102.25, which still is less than the price the bankers paid for them.

Other utility offerings have been confronted with similar conditions. Kansas City Power & Light, for example, in June sold to a banking group at 101.5213 $12 million of 2.875% bonds due 1978. The original intention of the group was to offer them to the public at 102, yield 2.775%, but later in the day the price was reduced to 101.515 to yield 2.80%, which was slightly less than the bankers paid for the bonds. When the syndicate closed, the bonds fell to 98, but have since recovered some of their loss. The list of such experiences is too long to go any further with it.

The underlying force in all this is the operation of our old enemy the law of supply and demand. During the year to date new security sales by telephone and electric utilities, for new capital only, have aggregated amounts that are huge in

(Please turn to page 84)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Loomis
ADVERTISING
COMPANY
ABILITY...
For almost a quarter-century the Loomis Company has repeatedly demonstrated its ability to produce high advertising revenues for telephone companies.
Whether your city is large or small... East, West, North or South... that proved Loomis sales ability can be efficiently applied to your market. You are invited to get the facts from Loomis... now!
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ST. LOUIS, MO. KANSAS CITY, MO.
UPPER DARBY (PHILA.), PA.
OMAHA, NEBR.

Nearing the goal of a long, LONG DISTANCE trail

Three years of top-speed telephone construction is showing real results in returning Long Distance service to prewar speed and quality. It's good to be able to tell the public this story of accomplishment.

Appearing in national magazines during September, the advertisement on the opposite page carries the glad tidings.

An advertisement of the

BELL TELEPHONE SYSTEM

GOOD NEWS about Long Distance

Today, Long Distance calls go through in about two minutes on the average. Now and then there are delays, but we're handling nine out of ten calls while you hold the line.

We've added many new circuits and switchboards and more are coming along. Our operators are courteous and they know their job.

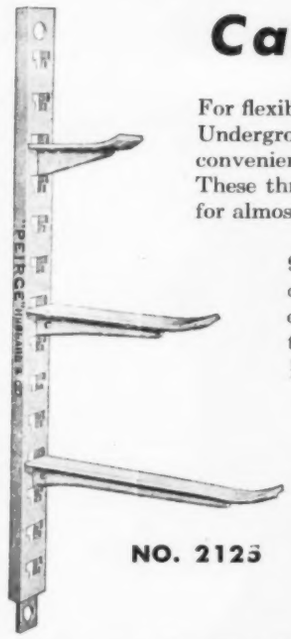
Our aim is to put your out-of-town calls through faster than ever before. And we're working hard to do it.

BELL TELEPHONE SYSTEM

JOHN LINEMAN OFFERS..

PEIRCE

Underground Cable Racks



For flexibility and ease of installation, Peirce Underground Cable Racks are made in three convenient lengths: 15, 24, and 30 inches. These three basic sections may be combined for almost any desired length.

Sections are made from 1½ by 9/16 by 3/16-inch open hearth steel channel and will support the heaviest cables. Racks are fastened to the manhole walls by means of a ½ by 4-inch Peirce Expansion Bolt.

Hooks adaptable for insulators and cut from open hearth "T" sections, have a smoothly rounded top surface which will not injure the cable sheath. Hooks are easily attached and lock securely when weight of the cable is placed upon them.

NO. 2123

A. T. & T. Co. Standard

ALSO— HUBEYE NUTS ○ HUBEYE BOLTS

ANCHORS, PLATE AND SCREW ○ MANHOLE LADDERS

BRACKETS, POLE, CORNER AND HOUSE ○ EYE BOLTS-HUBEYE

CARRIAGE BOLTS ○ CROSS ARM BOLTS ○ GUYING ACCESSORIES

CABLE SUSPENSION HARDWARE ○ POLE BALCONIES ○ PINS

STORM GUY ATTACHMENTS ○ SIDE-WALK GUYS ○ SPAN CLAMPS

LAG SCREWS ○ MESSENGER DEAD ENDS ○ CABLE RACKS ○ BRACES

DRIVE HOOKS ○ EXTENSION ARMS ○ POLE STRUTS ○ GUY CLAMPS

POLE STEPS ○ STUBBING BANDS ○ STRAIN PLATES ○ CABLE SHIELDS

GUY PROTECTORS ○ GUY HOOKS ○ MACHINE BOLTS ○ POLE SEATS

GRADE CLAMPS ○ GROUND RODS ○ TRANSPOSITION BRACKETS

"HANG THE LOAD ON HUBBARD HARDWARE"

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH CHICAGO OAKLAND, CALIFORNIA

comparison with the figures of corresponding previous periods. The increasing supply of the goods would in itself be sufficient to bring about some weakening in prices, but there have been other reasons.

Rising money rates have always been regarded by informed investors as a warning signal. Traditionally they have been followed by declining prices of fixed-return securities, but this time the price decline in such securities preceded the advance in money rates, and most institutional investors, at least, think this trend will continue for a long time. Moreover their operating costs have been rising too, and they now insist on higher rates of return from their investments than they formerly had to accept. From even the highest grade bonds they now fight for at least 3.00% yield.

This has all been taking place while the supply of funds available for investment has been shrinking. Accumulations of capital in corporate and individual hands are nothing like what they were in 1945 and 1946, or even 1947; current savings of individuals especially have been declining and have been going more and more into the hands of life insurance companies, savings banks and the like. The market now is predominately institutional, with demand approximately equal to supply, generally speaking. Some authorities assert that current and early prospective demands of industry of all kinds for capital to finance expansion and modernization are running in excess of current savings.

Convertible Issues

STYLES CHANGE in securities almost as quickly as they do in women's clothes, and for exactly the same reason; To enable the manufacturers and merchants to sell them. The latest style in securities is the convertible bond or preferred stock, types that were familiar some ten years ago, then for a time fell into disuse. The current vogue among the utilities began in November 1946, when American Telephone offered to its stockholders $343 million of convertible 2.75% debentures due 1961; their scheme was a clever one, making the debentures convertible into stock, both at face value, but only upon payment of $50.00 new cash per share. One year later, in November 1947, company made another similar offer, this time of $357 million of 2.75% debentures due 1957, convertible from March 1, 1948 into stock par for par plus $40.00 cash

per share. The reduction in the cash payment reflects the deterioration in the market for company's securities during the interim. By the end of August some $130 million of these 1947 debentures had been converted, resulting in reduction of that amount of debt, the issue of the same par value of stock, and the receipt by the company of $52 million in cash more than it received upon the original sale of the debentures. Thus the operation has been successful for the seller, accomplishing (to date in part only, of course) exactly what it planned.

Thus far in 1948, however, no telephone company has offered preferred stock, bonds or debentures with a conversion feature. Several electric utilities have done so: Virginia Electric & Power 3.125% convertible debentures 1963 in March, Consolidated Edison of New York 3% convertible debentures 1963, offered in June. Also Northern Indiana Public Service 4½% convertible junior preferred (January), Lake Superior District Power 5% 2nd Preferred (May), South Carolina Electric & Gas 5.50% convertible preferred (May), Southern California Edison 4.56% preferred (May), California Electric Power 5.50% convertible preferred (June).

The privilege of convertibility into common stock, provided the conversion price is made at or not too far above the current market price of the stock, often enables the issuing company to sell its convertible issue at a price higher than it would receive for a straight bond or preferred, thus for a time obtaining new capital at lower cost that it otherwise would have to pay. But there is another factor to consider.

So long as American Telephone convertible debentures are outstanding as such, the money cost to the company is roughly 2.75% per annum, and at such cost company should make a profit on the use of the money; but as debentures are converted the money cost rises to 6.00% and 6.43% for the 1961 and 1957 issues respectively, so long as company continues to pay a $9.00 dividend. The Bell system consolidated last year made only 4.16% return on the average depreciated book cost of its plant, and 6.36% in 1946, and without substantial rate increases cannot possibly make as much as that from new plant installed at present higher costs.—THE END.

Crapo
Galvanized Steel
CABLE LASHING WIRE

Widespread adoption of the "spinning" method of cable suspension has brought increased demands for a superior and consistently dependable lashing wire. . . .

Crapo Galvanized Steel Lashing Wire (.091 inch diameter) has been developed specially to fill these demands. It is manufactured from selected steel, is carefully processed and is given a heavy zinc coating for longer life. The finished wire conforms, in every respect, to the exacting specifications of leading telephone engineers—for ductility, tensile strength, torsion and galvanizing.

Crapo Galvanized Steel Lashing Wire is put up in neat, compact, thread-lay coils for ease in handling. For use in modern cable-spinning machines. Packed in cartons containing 6 coils, each coil containing approximately 325 feet of wire.

☆

"STAINLESS STEEL"

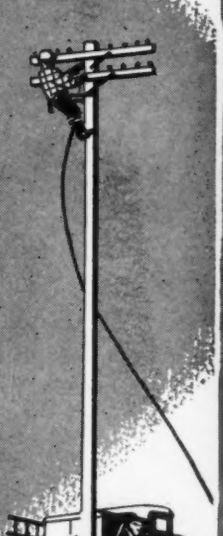
Crapo Cable Lashing Wire also can be supplied in "Stainless Steel" (.065 and .045 inch diameter). Complete details will be forwarded upon request.

Contact your jobber of *Crapo* Galvanized Telephone Wire and Strand or write direct for further information!

INDIANA STEEL & WIRE COMPANY · MUNCIE, INDIANA

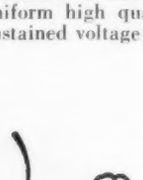
The Satisfaction Lasts When You Buy Products

Recommended and Guaranteed by KELLOGG



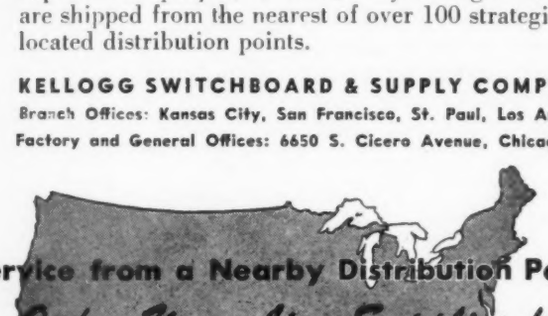
Dependable—is the word for "Eveready Columbia Gray Label" telephone dry cells. Dependable because they are manufactured by NATIONAL CARBON COMPANY, INC., under rigid laboratory controls that assure uniform high quality—extra days of service. Dependable because their sustained voltage means improved transmission efficiency.

For Long-Lasting Lines—Copperweld Line Wire provides the ultimate in dependability, economy, strength, high conductivity, and rust-resistance. It consists of a thick, protect've copper covering, welded to an alloy-steel core. This is the only line wire made by COPPERWELD STEEL CO.'S Molten-Welding Process, which assures perfect interlocking of the metals.



There's three-way satisfaction when you concentrate purchases of line supply and construction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 100 strategically located distribution points.

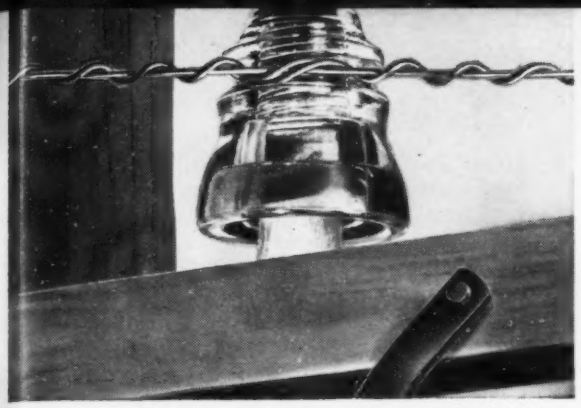
KELLOGG SWITCHBOARD & SUPPLY COMPANY
Branch Offices: Kansas City, San Francisco, St. Paul, Los Angeles
Factory and General Offices: 6650 S. Cicero Avenue, Chicago 38



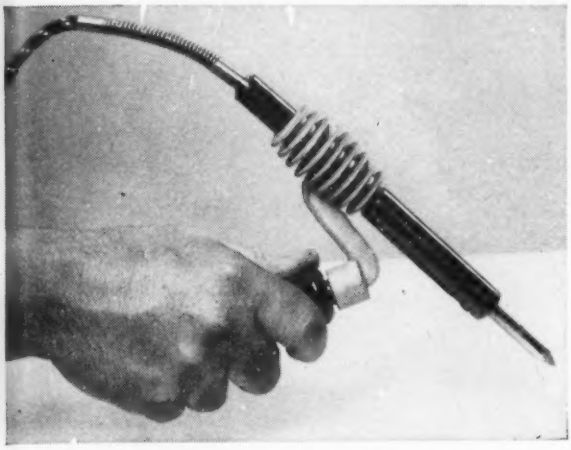
For Service from a Nearby Distribution Point

Order Your Line Supplies from

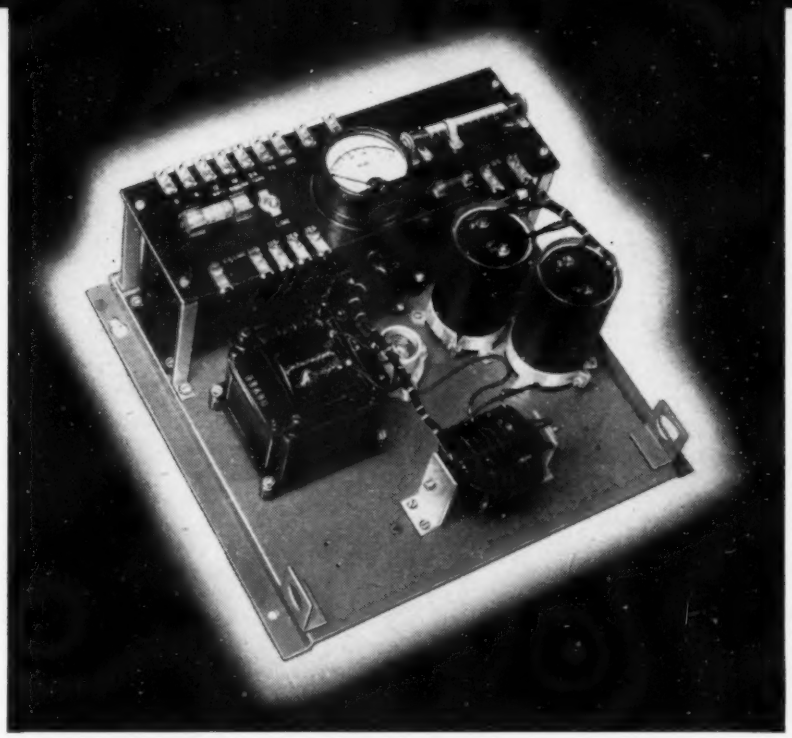
KELLOGG

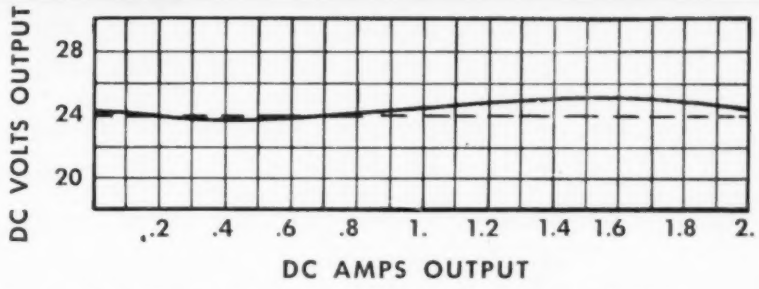


Meet Every Service Need. That's why so many telephone companies use Armstrong Glass Insulators. Made by ARMSTRONG CORK CO., they feature crystal clarity of glass, accurate gauging, and unusual resistance to temperature changes. A good bet for reducing maintenance costs.

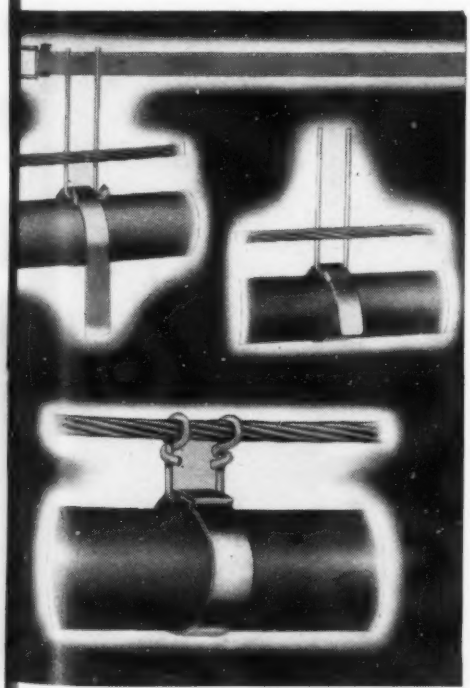


Makes Better Soldering Easier —Vulcan Counterpoised Electric Tool made by VULCAN ELECTRIC CO. does more work, easier, because it's so perfectly counterpoised that the tip seems to be attracted like a magnet to the part to be soldered. Handy plug tip, with all parts replaceable.

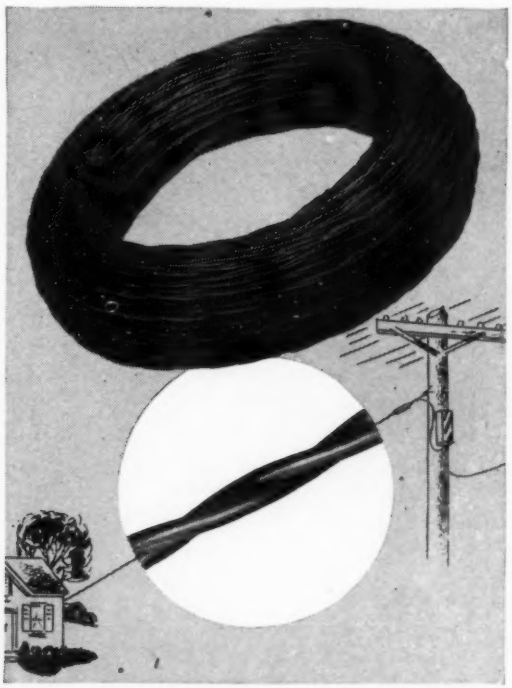




Steady D. C. Voltage required by switchboard lamps and telephones (especially dial) can always be assured with a RectiFilteR. Chart shows typical curve of DC output voltage under varying loads, proving that this RAYTHEON MFG. CO. unit provides stabilized output voltage regardless of AC line variations. With no moving parts, maintenance is very low.



Stretch the Life Span of Cable by using Adjust-A-Straps near poles. These NATIONAL TELEPHONE SUPPLY CO. products entirely eliminate ring cutting and friction damage to cable. Full hinge motion allows necessary play as cable vibrates, expands or contracts.



Drop Wire Lasts 30% Longer! GENERAL INSULATED WIRE WORKS Bronze Drop Wire lasts longer because it's drawn of solid, noncorrosive bronze and covered with hard-wearing Neoprene insulation. You'll find that this drop wire is flexible and easy to handle.

Drier Than the Driest Desert! Drierite Desiccant is the safer way to dry splices in lead-covered cables. It absorbs all moisture; makes the splice the driest part of the cable. This W. A. HAMMOND DRIERITE COMPANY product will not harm conductors or insulation.

HUBBARD

HOLD THAT LINE!

with HUBBARD

Hubbard Pole Line Hardware will stand the gaff. You can install it and forget it as far as time and weather are concerned. Every piece of Hubbard Pole Line Hardware is made from new, open-hearth steel or certified malleable iron—double-dipped in molten zinc for a dense, non-porous time and weather-resisting surface. Every one of the hundreds of pole line items that bear the Hubbard trade-mark is recognized as standard equipment in every branch of the Industry. You can be sure of the best when you specify Hubbard.

• Brackets • Anchors and Rods • Braces • Nuts—Washers • Cross Arm Bolts • Guy Clamps • Eye Bolts—Hubeye • Guy Hooks • Strain Plates • Ground Rods • Cable Racks • Drive Hooks • Pins and Cobs • Sagger Brackets • Bonding Clamps • Machine Bolts

RECOMMENDED AND DISTRIBUTED BY

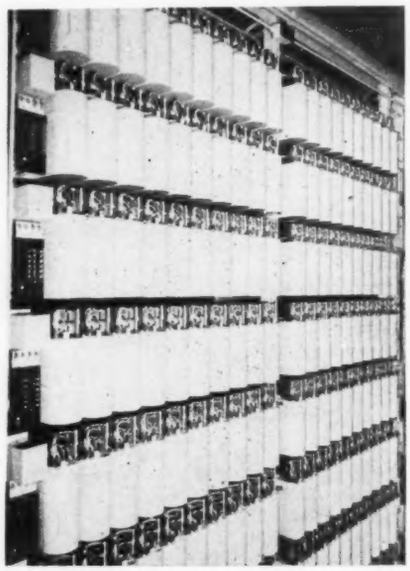
AUTOMATIC ELECTRIC
SALES CORPORATION

1033 WEST VAN BUREN STREET : CHICAGO 7, ILLINOIS

Texarkana Converted To Automatic

One of the largest Independent Automatic conversion projects in the Southwest was completed July 31 in Texarkana, Tex.-Ark., by the Two States Telephone Co. The line dividing the states of Texas and Arkansas runs right through the middle of the main street of the city, so that approximately half of the city is in the state of Texas and half in Arkansas.

A. C. Stuart, president of the Two States Telephone Co., placed the first calls over the new system to the mayors of Texarkana, Texas, and



Texarkana equipment has capacity of 5300 lines and 8400 station terminals.

Texarkana, Arkansas, announcing to them that his company is now in a position to offer the people in their communities the highest grade of telephone service known to the art.

The automatic central office equipment, of the Strowger step-by-step type, engineered, manufactured and installed by Automatic Electric Co., has a capacity of 5300 lines and 8400 station terminals. A new 22-position Automatic Electric toll board was also installed.

The city of Texarkana has grown so rapidly that plans have already been completed to increase the capacity of the switching equipment by 1200 lines and four additional toll positions. J. S. Stuart, vice president of the Two States Company, announced that 1500 applicants await service and many requests for the upgrading of service have been received.

Automatic Electric was represented at the cutover by F. A. Davis and H. L. Houseley of the sales organization; R. C. Chock of the engineering department; and J. E. Mahoney, in charge of installation.

• PEOPLE •

Indiana Associated Telephone Corp. has announced appointment of **F. B. Cuppy,** district commercial manager for the Lafayette district, to new post as commercial engineer in the general commercial office at Lafayette, Ind.

Chris B. Hansen succeeds Mr. Cuppy as district commercial manager for the Lafayette district.

Marlin Rubyor, has been appointed manager of the Cadott-Boyd, Wis. exchange of the Northwest Telephone Co.

B. E. Riggs, manager of the branch for the past four years, has returned to Rudolph, Wis.

Vernon A. Allan, commercial superintendent of the Central Missouri Telephone Co., Warrensburg, has been transferred to Scottsbluff, Neb., as commercial and traffic superintendent. for the Platte Valley Telephone Corp.

Mr. Allan started his telephone work in 1938 with the Iowa State Telephone Company. He spent a year and a half with the Central Carolina Telephone Co. before serving for three years in the army air corps.

Loren M. Berry has announced the appointment of **Leonard J. Wyeth, Jr.,** as production manager of L. M. Berry & Company.

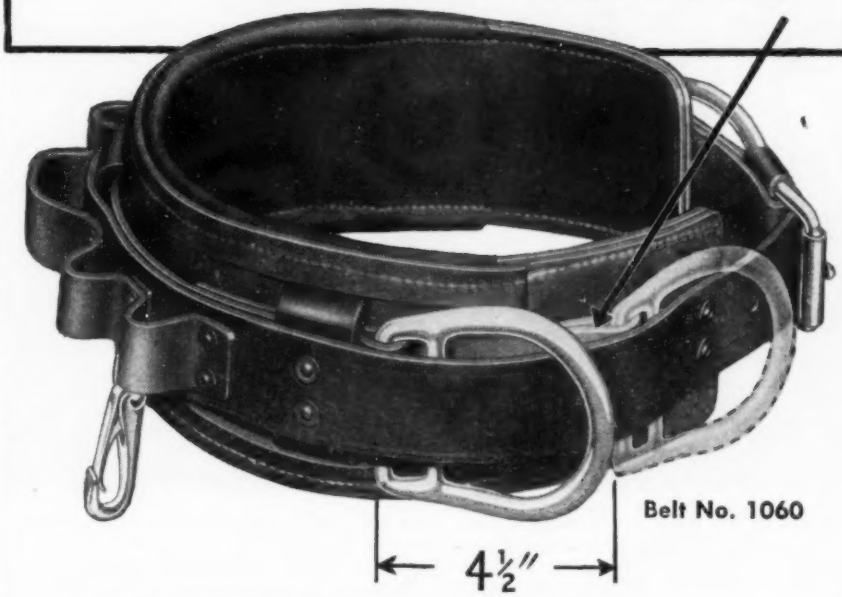
Mr. Wyeth joined the company in January of this year. Formerly he was associated with the International Telephone & Telegraph Corp. After two years in New York, he was transferred to the Cia. Union Telefonica del Rio de la Plata, Ltda., Buenos Aires, Argentina. In 1944 he returned to this country to enter the U. S. Navy after which he continued with the I. T. T. in their Telephone Operating Department at headquarters until November 1947.

T. O. Cagle has accepted a position as manager of the office of the Illinois Commercial Telephone Company, Tuscola, Ill., replacing **Samuel W. Cohagen,** who has resigned.

Mr. Cagle tranfers to Tuscola from the plant area office of the Illinois Commercial Company at Murphysboro. He has served the company for the past 20 years.

Mr. Cohagen became manager at Tuscola on August 1, 1946. He plans to move to Albany, Calif.

Turn freely
in this belt . . .



Belt No. 1060

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Glider TOOL BELT

Yes, with this tool belt, you can turn up to 4½" right or left without binding your clothes or cramping your tools. That's because the Glider Tool Belt has a "floating" feature that allows fuller, freer body movement. Here's how: The middle belt, attached to the safety strap, does not move when you turn. The safety strap does not shift on the pole. The outer strap and inner liner slide easily without pulling or binding . . . without costly wear and tear on your clothing. Tool loops remain full and open. You can turn without tiresome, time-consuming shifting of your feet. You can change your position quickly, easily and safely.

And you can depend on the Glider Tool Belt for that all-important safety too. It's made of stout, tan-colored harness leather and stitched with tough nylon thread. It's built to the highest standards of quality to give you a good, dependable belt.

A BUCKINGHAM BELT is a good belt.

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A sturdy, practical tool belt built to give you years of comfortable, trouble-free service. Rolled edge leather lining. Inner belt is 4½" at back, tapering to 2½" at heel of dee ring. 2" belt strap has five tool loops and is fitted with harness ring, snap hook and tape thong. Inner belt has tab extended on each side. To these you can rivet any standard or special tool holsters or pouches.

See these tool belts at your regular supply house, or—write directly to us for Catalog 548 describing the full Buckingham line of equipment.

BUCKINGHAM MANUFACTURING CO., INC.
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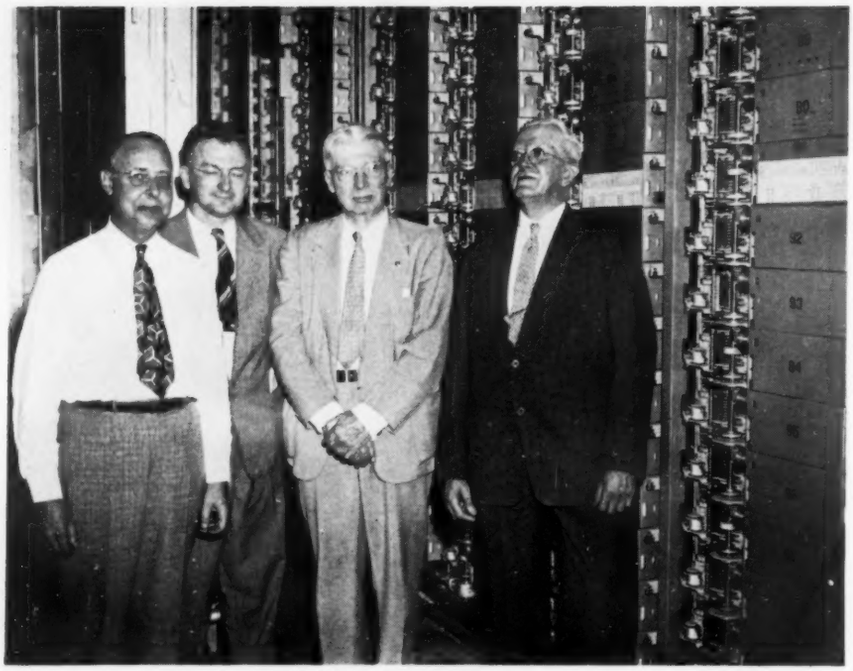


Officials of the Rochester Telephone Corp. observing the cut-over from manual to Federal 7A-2 Rotary Dial Switching at the Baker-Hamilton Exchange, Rochester, N. Y. (l. to r.) Donald H. Campbell, executive vice president; G. William Miller, chief engineer; John P. Boylan, chairman of the board, and John W. Morrison, president and general manager.

First U. S. A. Rotary Dial Equipment Cut Into Service at Rochester, N. Y.

ANOTHER milestone in the progress of Independent telephony in the United States was reached at midnight, August 27, when the Rochester (N. Y.) Telephone Corp., the second largest Independent company in the country, successfully accomplished the first of a series of cut-overs in the ultimate conversion to dial service of the entire multi-office network in the city of Rochester.

The initial cut-over, involving 8,716 lines and 13,669 main stations out of totals of 18,400 lines and 28,400 terminals installed, gave to Rochester the distinction of being the first city in the United States to place in operation the 7A-2 Rotary Dial Switching System manufactured by Federal Telephone & Radio Corp., associate of the International Telephone & Telegraph Corp. This conversion, which inaugurated the Rochester Telephone Corporation's new Baker and Hamilton exchanges, was the largest initial cut-over from manual to dial operation made by an Independent telephone company in many years. An unusual feature of the cut-over is that it was made at midnight Friday, instead of Saturday, which gave opportunity for "shakedown operation" during the light business traffic of Saturday and the normal traffic of a Sunday, preparatory to handling the heavy commercial load on Monday.

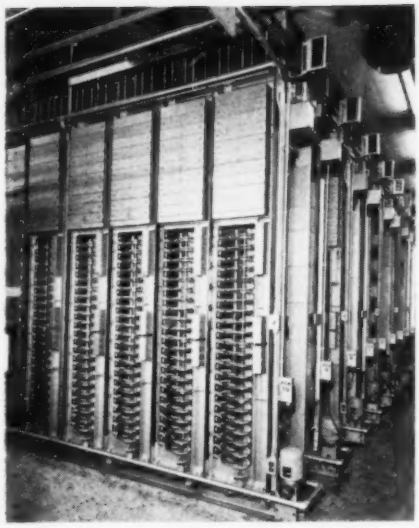
Attending the cut-over were: John W. Morrison, president; John P. Boylan, chairman of the board; G. William Miller, chief engineer and other officials of the Rochester Telephone Corp. From Federal were Admiral Ellery W. Stone, president; L. J. Denney, director telephone Division; I. W. Gleason, sales manager; R. W. Engsberg, chief engineer; and from International Telephone & Telegraph Corp., William Hatton, vice president.

Rochester's first cut-over to Federal Rotary Dial equipment was made in the corporation's new three-story Baker Central Office building. This imposing structure, of modern design, adjoins the old Stone Central Office building at 39 Stone Street, the birthplace of Independent telephony in Rochester in 1899. The new central office building eventually will contain two other rotary dial exchanges—Empire and Locust—in addition to the present Baker and Hamilton exchanges and the commercial office of the Rochester Telephone Corporation. The old Stone Street office is now being remodeled also for use by the Corporation's commercial department.

Prior to the August cut-over the corporation's manual multi-office network in the city consisted of eight central offices: Charlotte, Culver, Genesee, Glenwood, Hillside, Monroe, Stone and Main. Under the cut-over, all Stone manual office subscribers and approximately 25 per cent of the Main manual subscribers were transferred to the new Baker and Hamilton exchanges.

The second step under the corporation's city-wide conversion program

LEFT PHOTO: John W. Morrison, president and general manager of the Rochester Telephone Corp., starts the cut-over which brought modern dial telephony to Rochester. Watching Mr. Morrison as he starts the cut-over are Admiral Ellery W. Stone, president of Federal Telephone & Radio Corp., (center), and G. William Miller, chief engineer of the Rochester Telephone Corp., (right). RIGHT PHOTO: Officials of the Rochester Telephone Corporation and Federal Telephone & Radio Corporation watching the Rotary Dial Switching System being cut into service. Included in the group are John P. Boylan, chairman of the board, John W. Morrison, president and general manager, and Donald H. Campbell, executive vice president, all of the Rochester Telephone Corp.; and Admiral Ellery W. Stone, president, and L. John Denney, director of the telephone division, both of the Federal Telephone & Radio Corp.



A section of the third group selector local bays of the Federal 7A-2 Rotary Dial Switching System at the Baker Hamilton Exchange of the Rochester Telephone Corp.

calls for the transfer, at the close of the year, of all Main pay station lines to the new Empire rotary unit. The final step of the first group of three cut-overs will be the transfer of all remaining Main manual subscribers to the Locust rotary exchange. Former Stone and Main subscribers now enjoying dial service include the principal shopping and banking district in the heart of the city of Rochester as well as many leading industrial firms. The remainder of the local central offices will be converted to dial operation as rapidly as practical. At the present time the local multi-office network comprises 50,060 lines and 131,632 stations.

Rochester's rotary installation was designed by engineers of the telephone company, Federal and I. T. & T. to meet the city's specific requirements, such as: The provision for swift and accurate interconnection of manual and dial central offices during the period of conversion, the subsequent integration of the system through inter-central office automatic trunking, the efficient handling of Rochester's exceptionally high percentage of two, four and eight party lines. In solving these and others of Rochester's special operating problems, many new and important technical improvements were incorporated in the 7A-2 Rotary System installed by Federal.

Rochester's 7A-2 dial system is a power-driven system that utilizes finder, selector and sequence switches and flat type relays, grouped in various combinations and mounted on bays. These bays, in turn, are mounted in switchracks and arranged in 2,000-line groups.

An important feature of the system is the positive control of selection, whereby the selector switches transmit revertive pulses to the register as to their position and stage of operation, and also receive controlling signals from the register. Another important feature of the system for a city the size of Rochester is its method of doubling-up trunk groups. With this system a 10,000-line office can be served over only five levels of 3rd group selectors.

The Rochester installation includes a 14-position Dial Service Assistance board, of which two positions are for the official PABX; a four-position wire chief's test panel, a two-position repair clerk's desk and a centralized observation desk. In also includes a special toll register designed to interwork with Bell System 6-frequency key pulsing and nationwide toll operator dialing. This is the first installation of this type of dialing to be placed in service by an independent telephone company. Other features are a controlled ringing toll train for the Rochester Telephone Corporation's DSA board, and circuits to permit the use of special non-metering lines to the police, and fire departments.

The corporation's official 7J PABX, a new Federal development which permits the official, or company, stations to dial any telephone in the Rochester area, is designed to work with the Rochester rotary system. This PABX utilized a simple line finder type of switch for all switching functions.

The telephone numbering scheme of the Rochester installation permits office subscribers to dial not only other dial subscribers' numbers, but the complete telephone numbers of subscribers in manual offices. No changes in present manual office telephone numbers are required.

The subscriber's message register is on a fourth wire, independent of the cut-off relay, so that the meter and the cut-off relay may each be designed to best perform its particular functions. The party line arrangement is such that any four telephone numbers may be grouped together on a single line.

Built-in, permanently-wired, direct reading automatic traffic recording is another feature of the Rochester system. The traffic man may register the traffic in any important or major group of trunks merely by throwing a key. The equipment will automatically record the traffic during the busy hours and then stop under its own control.

Leich Issues New Magneto Switchboard Bulletin

Bulletin 274 recently issued by the Leich Sales Corp., 427 West Randolph St., Chicago 4, Illinois, describes the

RUNZEL CORDS

FOR Every TYPE INSTRUMENT

Finest workmanship in the trimming operation.

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these features assure a consistent quality cord in every detail and are responsible for the clarity of reception for which RUNZEL CORDS are popularly known.

RUNZEL QUICK SERVICE

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Whitney Blake TELEPHONE WIRE

When you want drop wire, bridle wire, or inside, jumper, or duct wire, there just isn't any point in using anything but Whitney Blake. For this line — made of top-quality materials, including Teleprene and Plastite insulations — really has "been through the mill" of laboratory and field tests . . . and has come through with superior ratings in all characteristics!

W-B wire is one of the hundreds of telephone supplies which Graybar distributes. They're *all* first-quality products of leading manufacturers.

Whatever your supply requirements, the easiest way to get them is to call our nearest office. A Graybar specialist can be of real help in solving any of your electrical problems. *Graybar Electric Company. Executive offices: Graybar Building, New York 17, N. Y.*

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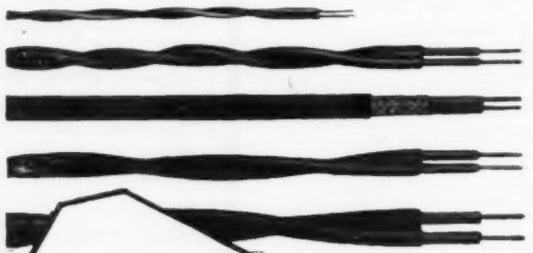

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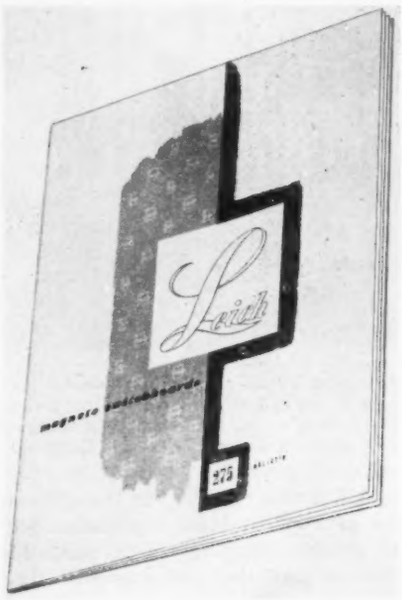
complete line of Leich magneto switchboards and equipment.

The attractive 27 page bulletin presents complete information on the Leich magneto switchboard including the Number 4c, Number 25, the Leich



NEW LEICH BULLETIN
". . . *presents Leich Magneto swbds.*"

universal switchboard, the 17B magneto wall switchboard and descriptive information on replacement and repair parts.

Frank Walker Joins Motorola Inc.

Frank W. Walker, Battle Creek, Mich., former chief engineer for Greyhound Bus Corp., has been appointed by Motor-

FRANK W. WALTER
". . . *joins Motorola Inc.*"

ola Inc. as radio communication engineer in the state of Michigan. Walker, an experienced 2-way FM mobile radio en-

It means just ONE thing . . .

IT'S a familiar sight. And every time you see a big reel marked ***Western Electric*** it means just one thing—more *telephone cable* to provide more and better telephone service.

To help handle your ever-growing use of the telephone, Western Electric this year is making cables containing over *13 million miles* of wire!

Millions of telephones—great numbers of switchboards—and countless other items are being made, too.

For 66 years, Western Electric has been the manufacturing unit of the Bell Telephone System—helping to make your service the world's best at the lowest possible cost.

MANUFACTURER of telephone apparatus for the Bell System.

PURCHASER of supplies for Bell telephone companies.

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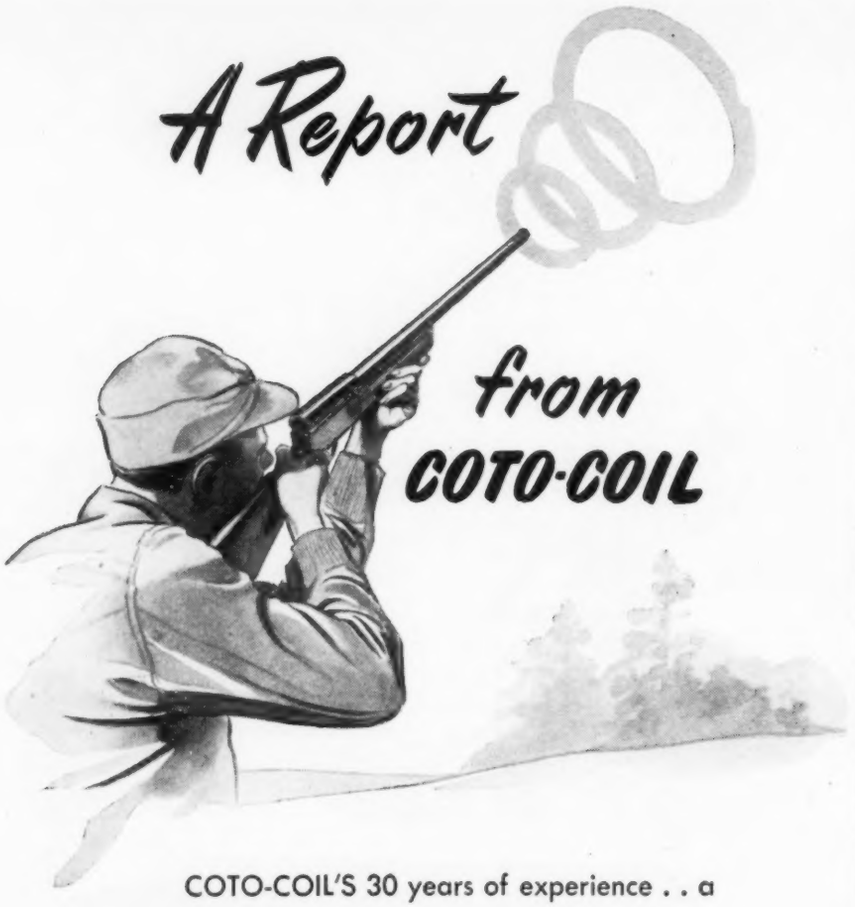
INSTALLER of Bell System central office equipment.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

A Report from COTO-COIL



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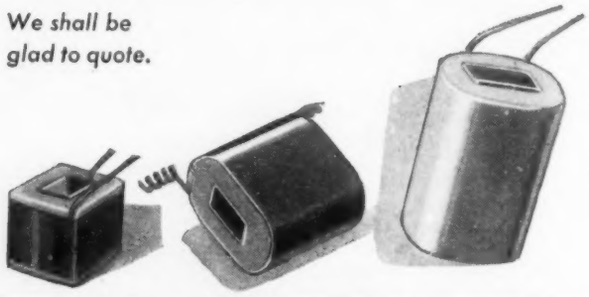
We shall be glad to quote.



COTO-COIL CO., INC.
COIL SPECIALISTS SINCE 1917
65 Pavilion Ave., Providence 5, R. I.

gineer, came to Motorola after designing and installing the nation's first cross-country bus 2-way radio network for the Greyhound Corporation.

The previous 10 years he spent as chief engineer for the Michigan State Police where he installed one of the largest state police 2-way radio systems in the country. As a result of these two assignments Walker is well qualified for his new position, as both the Greyhound Bus and Michigan Police installations are all Motorola equipment. He was a transmitter design engineer for the Midwest Radio Laboratory for two years prior to working for the Michigan State Police.

Frank Walker is widely known in the 2-way radio field for his two terms as National President of the Associated Police Communications Officers, his work as Vice Chairman of Panel 13 of the Radio Technical Planning Board and 20 years as an amateur radio operator.

Rear Admiral E. W. Stone Elected Pres. of Federal Tel.

The election of Rear Admiral Ellery W. Stone (USNR) as president and General William H. Harrison as chairman of the board of both the Federal Telephone & Radio Corp., and the

REAR ADMIRAL E. W. STONE
". . . eleced president of Federal."

International Standard Electric Corp., was announced August 26 by Colonel Sosthenes Behn, chairman and chief executive officer of the International Telephone & Telegraph Corp., parent concern of the two companies. Fred T. Caldwell, formerly president of Federal Telephone & Radio and International Standard Electric was elected vice chairman of the boards of both corporations. The appointments became effective on September 1.

Admiral Stone, since 1931, has

served in various executive capacities with the I. T. & T. System, most recently holding the post of executive vice president of Federal Telephone and Radio, domestic manufacturing subsidiary of I. T. & T. General Harrison, vice president in charge of operations and engineering of the American Telephone & Telegraph Co., recently was elected president of I. T. & T., also effective on September 1. During the war he served as a Major General, acting as director of Procurement, Army Service Forces, Washington, D. C.

A native of Oakland, California, Admiral Stone attended the University of California where he specialized in radio engineering. From 1924 to 1931 he was president of the Federal Telegraph Co., prior to acquisition by I. T. & T., and from 1931 to 1937 was operating vice president and director of the Mackay Radio & Telegraph Co. He then served as executive vice president and Postal Telegraph, Inc., and was elected president of the Postal organization in December 1942. In 1943 he was recalled to active duty with the United States Navy. He served as chief commissioner of the Allied Commission for Italy until early 1947, with headquarters in Rome.

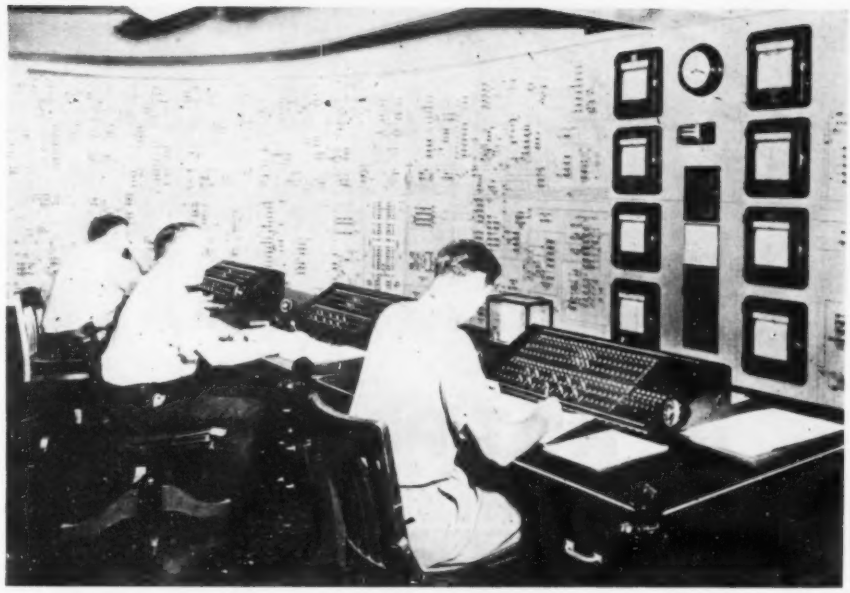
In addition to various campaign medals for service during World Wars I and II, Admiral Stone also holds both the United States Navy and the United States Army Distinguished Service Medals. He is a Knight Commander of the British Empire, a Knight of the Grand Cross of St. Maurice and St. Lazarus (Italy), a Grand Officer of the Crown of Italy, and a Knight of the Grand Cross of San Marino.

Kellogg Equipment Serves Tennessee Valley Authority

One of the most unusual installations of equipment manufactured by the Kellogg Switchboard & Supply Company, Chicago, is a three-position turret-type switchboard at the central load dispatcher's office of the TVA (Tennessee Valley Authority) in Chattanooga, Tenn. The communications network needed to coordinate TVA's power plants is said to be the largest and most modern of any owned by a single power utility in the world.

The switchboard is the "key" control for a 6,000-mile telephone system. Use of the board keeps engineers and operators at all the widely separated dams and power stations in touch with each other day and night.

Load dispatching involves keeping a continuous balance between different sized turbines, which are kept spinning by water falling from TVA dams, and the varying needs for kilowatt-hours by users. Since the TVA covers an 80,000 square-mile area, the highest control precision is required.



Three-position, turret-type Kellogg switchboard is "key control" for TVA's 6,000 mile telephone system.

This is where the need for a reliable communications network, tied together by a "master" turret switchboard, arises. The switchboards of the TVA communications network are thus coordinated through the turret board in the central load dispatcher's office.

About half of the TVA telephone circuits are "power line carriers"—that is, telephone conversations are carried over the high-voltage power lines themselves instead of the usual telephone lines. The TVA telephone network carries 2,500,000 messages each year.

ESTWING TOOLS
are
CUSHIONED for
COMFORT

The sole-leather laminated construction of Estwing Tool handles, with I-beam core, cushions the hand against shock, provides extra resilience for the perfectly balanced, finely tempered heads. Handles never break—heads cannot fly off! For hammers, axes and hatchets, specify Estwing.

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You Save–because

Amerstrand

is "HOT PROCESSED"

Analysis of the "hot" galvanizing shown in this microphoto reproduction indicates perfect bonding of the zinc with the steel base, thanks to a chemical blend of metals—pure zinc on the outside, an iron-zinc alloy increasing in iron content as it approaches the steel, and the steel base. There is no surface where metals might tend to separate.

Strand that's strong—for years to come—is assured by Amerstrand "hot processed" galvanizing. The steel wire is passed through a bath of molten zinc which bonds chemically with the steel. This coating of pure zinc (99.99% pure) becomes part of the wire itself. It does not separate under the toughest tests, but stays on the job, preventing corrosion, preserving the original strength of the strand. For greatest overall economy order Amerstrand; sizes and grades to meet every requirement.

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1033 WEST VAN BUREN STREET · CHICAGO 7, ILLINOIS

Hubbard & Co. Advances Richard G. Robbins

R. G. Robbins of Hubbard & Company, Pittsburgh, Pa., has been promoted to the office of divisional vice president, Eastern Division. Mr. Robbins has been sales manager of the

R. G. Robbins
". . . *becomes divisional vice pres.*"

eastern division for several years. Mr. Robbins started with Hubbard & Company June 13, 1923, as a "general" assistant to several department heads.

Federal Tel. Expanding Mobile Sales Staff

Justin J. Callahan has joined Federal Telephone & Radio Corp., Clifton, N. J., associate of International Telephone & Telegraph Corp., as sales representative covering the New England territory for Federal's mobile radio division.

Mr. Callahan, a native of Brooklyn, N. Y., has been associated with radiotelephone sales for some years and also has been active in marine and aviation instrument engineering.

During the war Mr. Callahan served in the Merchant Marine and later became Deck Training Officer in the Maritime Service. Mr. Callahan resides in Somerville, Mass., and his sales operations are carried out from FTR's New England headquarters, 43 Leon Street, Boston, Mass.

R. A. Kirkman Joins Cook Research Laboratories

Cook Research Laboratories, 1457 Diversey Parkway, Chicago, have announced the appointment of Robert A. Kirkman to its engineering staff. His work will be principally in the de-

sign and development of high-frequency communication equipment, including radar.

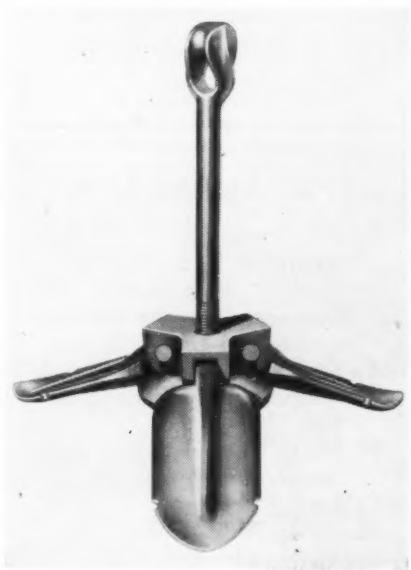
Mr. Kirkman comes to Cook Research directly from the Signal Corps Engineering Laboratories where he was chief section engineer for a period of five years. During the previous eight years he was associated with Teleradio Engineering Corporation, York Sound Research, General Electric Company and Municipal Broadcasting System in various engineering capacities.

Mr. Kirkman is active in professional groups, and at present is a senior member of the Institute of Radio Engineers, an alternate director of the American Relay League and a member of the Research and Development Board Subpanel on electronic tubes.

New Malleable, Expanding Anchor

A new expanding type, cone-slant anchor made of high-strength malleable Iron and approved by the R. E. A., has been announced by the Albion Malleable Iron Co., Albion Mich.

The new Albion-Dillon Anchor features three exceptionally long, cone-slanted blades that extend deeply into



NEW ALBION-DILLON ANCHOR
". . . will withstand 46,000 lb. pull."

undisturbed earth to provide maximum holding power. Tests have shown that the anchor will withstand a 46,000 pound pull.

Installation of the Albion-Dillon Anchor is simple and effective. A 3", 4" or 6" hole (depending on size of anchor) is dug with auger to desired depth. A strand of light wire is placed around blades to hold them in place (vertically, with blades pointing downward).

The anchor, with rod attached, is

ALPHADUCT WIRES
FOR *All* TELEPHONE REQUIREMENTS

LONG LIFE

Neoprene Jacketed
Drop and Bridle Wire

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Interior - Tree - Ground - Switchboard -
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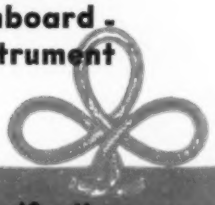

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Serve Up Strand Ends Quickly and Securely

With KEARNEY GUY WIRE CLIPS

This method of serving up strands is considerably more economical than the old method of using waste strand. Easily installed in one-fourth the time required by the older method, they serve up the guy strand ends more neatly and do not scratch or peel the strand galvanizing.

Available in six sizes in aluminum, galvanized iron or copper. Can be installed with pliers or with special Kearney Guy Wire Clip Tool.

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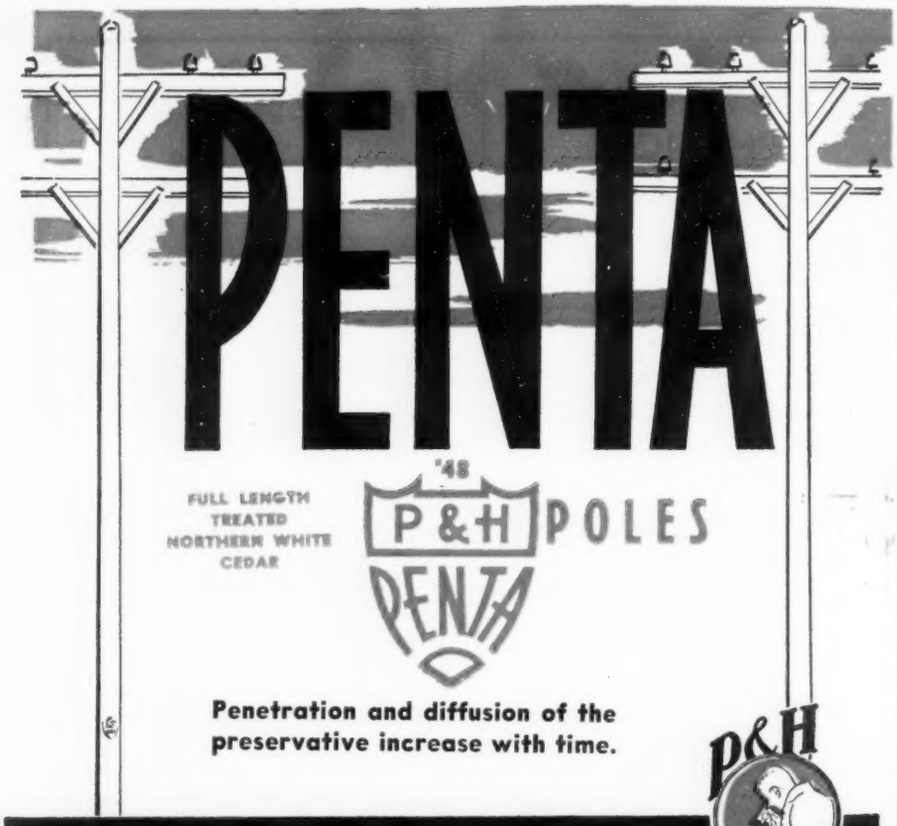

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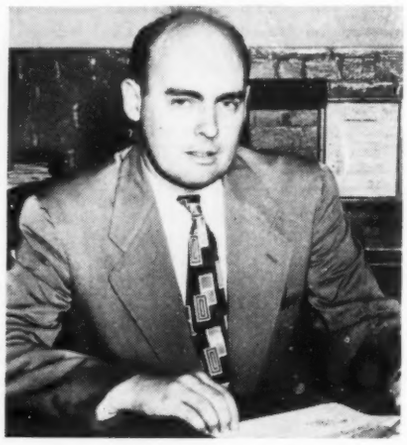
Federal T. & T. Expands Telephone Division

Edward J. Hart has joined Federal Telephone & Radio Corp., Clifton, N. J., associate of International Telephone & Telegraph Corp., as sales engineer, reporting to I. W. Gleason, sales manager, telephone division.

Upon relief from active duty with the Signal Corps in 1946, Mr. Hart became associated with the Stromberg Carlson Co., as sales engineer in the



EDWARD J. HART
". . . joins Federal as sales engineer."

telephone sales division, where his activities involved selling and engineering of both manual and automatic telephone switching equipment.

After graduating from the University of Notre Dame in 1940, where he obtained his B.S. Degree in Electrical Engineering, Mr. Hart spent two years as a civilian engineer with the Signal Corps Procurement District, Telephone Division. He was later commissioned in the Signal Corps and for three years was assigned to the Signal Corps Inspection Agency. In this capacity Mr. Hart initially was in charge of inspectors at telephone, radio and cable plants in the Chicago area. He later became Officer in Charge, Technical Section, Newark Signal Corps Inspection Zone.

A native of Brooklyn, New York, Mr. Hart now resides in Clifton, N. J.

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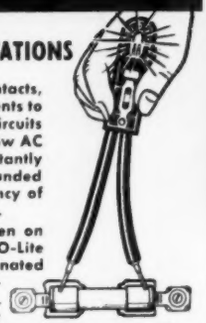

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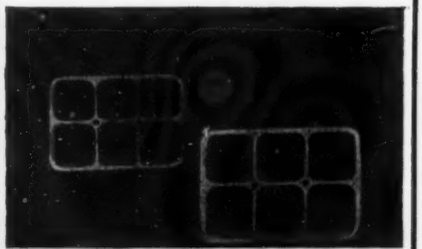

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PITTSBURGH, PA.

THE BACK OF THE BOOK

By JOHN G. REYNOLDS
Managing Editor

"Cutover Night" . . . It's a little like opening night for a million dollar Broadway musical comedy. Everything's all set to go. Technicians have been working like mad for months; lots of them have been considering themselves lucky to get four hours of sleep a night as the last adjustments are made.

And then come the wails? "Well, why couldn't my new number sound something like the old one? I can't remember it!"

Those moans have found their way to many telephone company offices. One master mind behind assignment of numbers, who has only a slight hunted look about him these days said:

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"We'll say we have 1,000 business subscribers, just as an example," he explained patiently. "So, we'll distribute 10 business subscribers among a bank of each 100. Not bunched—that would lead to confusion. But scattered. We try to break it down a little farther. In those 10 business places we try to spot a grocery store, an attorney—one each of the various types of telephone users. That way we try to provide an even flow of traffic through the banks."

• • •

Happiness . . . One of our friends—probably one tired of hearing us talk of our garden—included this observation on happiness in a recent letter. . . . "If you wish to be happy for an hour, get intoxicated. If you wish to be happy for three days, get married. If you wish to be happy for eight days, kill your pig and eat it. But if you wish to be happy forever, become a gardener . . . Chinese proverb.

"Pull weeds; fight bugs; sprinkle; pay for fertilizer; hoe; spade; rub linament on back; put tape over blisters; listen to kibitzing neighbors; worry about the weather; spray; cuss; look at the pictures in that damn seed catalog again; figure out that each radish costs you 25c and each tomato half a buck; wear out your pants at the knees; fight maurauding birds, rabbits, dogs; give up movies, ball games, golf! Hell, is that happiness? Better stick to telephone work!"

• • •

"Old Powers of a Buck" . . . One of the ironies of life with which we have to contend, is a memory which promptly divests itself of all that is useful, yet periodically overwhelms us with nostalgic recollections of the day when a folding buck bought a good Ingersoll watch . . . or a three-volume set of Henry Ward Beecher . . . or a score of short beers . . . or as many two-hour hitches at the village nickelodeon. The one spot to which we may turn today for a buy in which the dollar retains its pristine purchasing power is—of all places—the Government. One emasculated dollar is all it costs for the privilege of paddling a canoe through the Panama Canal. . . . And a nickel in a pay station is still good for a telephone call.

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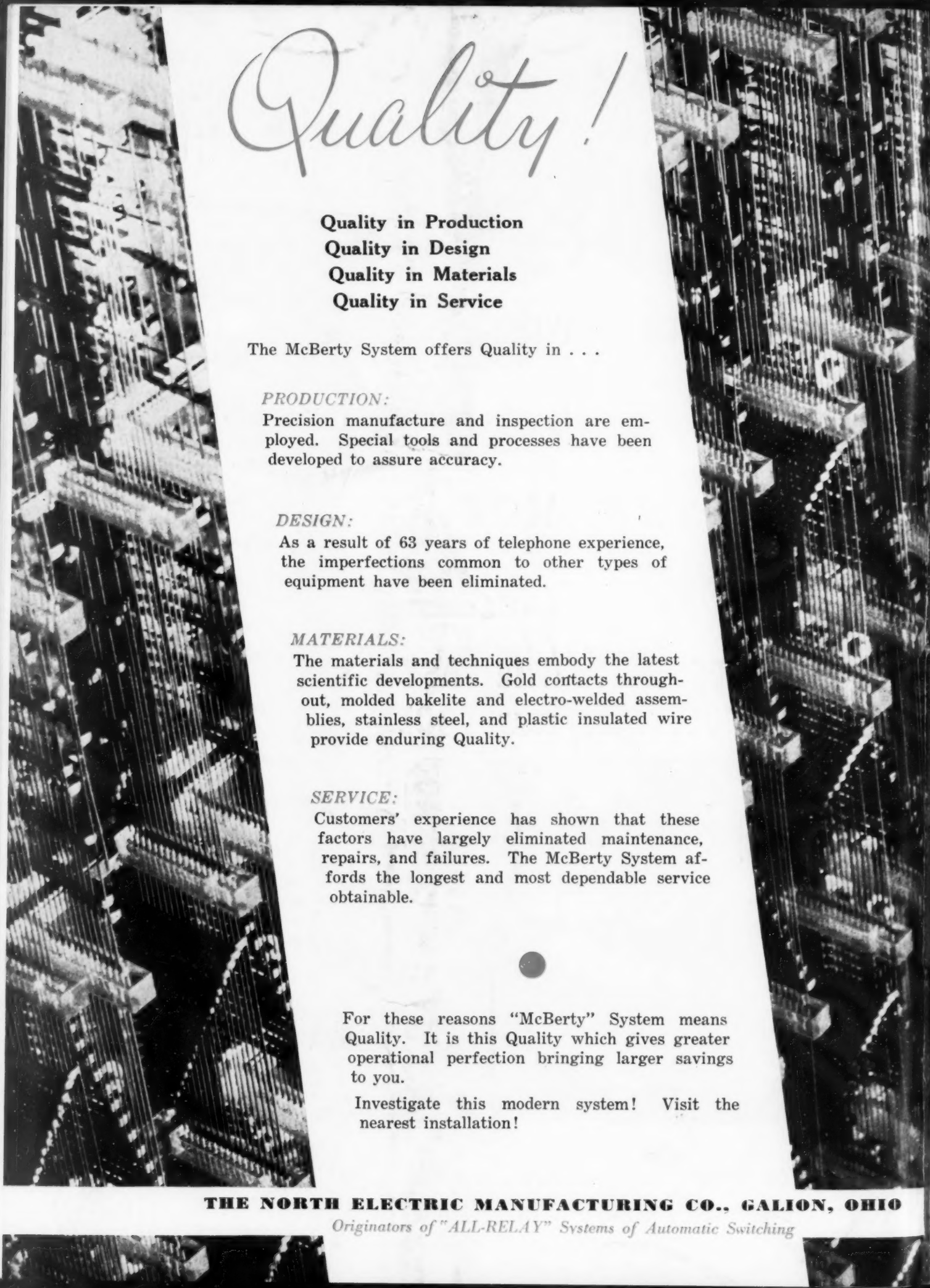

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